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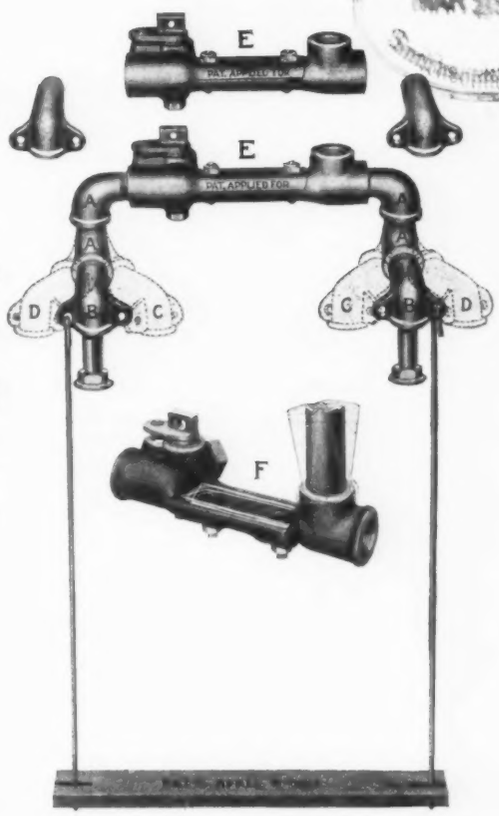

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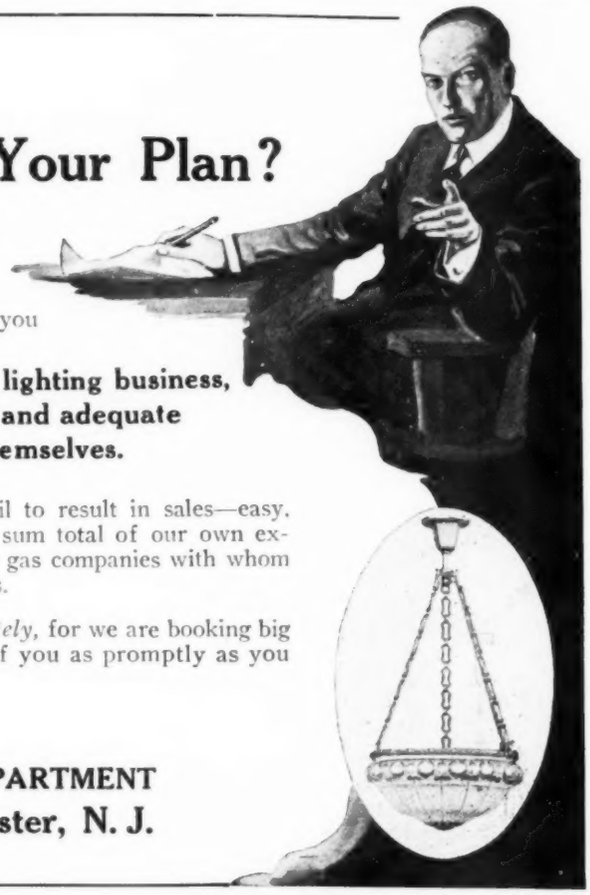

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Talking Business More Effective Than Fighting

Letting the Public Know Will Produce Results

By J. E. BULLARD

A certain utility company had been fighting for and pleading for an increase in rates but to no avail. Additions and extensions were needed if the quality of the service was to be maintained and the public expected the company to maintain it. These would cost money that it would be very hard to get. The company was scarcely paying expenses and no one wanted to invest money in a proposition that did not guarantee good returns.

Finally, in desperation, the manager of that company secured an opportunity to talk to the business men at a meeting of their association. There he showed them that they would have to put up the money with no prospect of any immediate return if those improvements were to be made. He went on to show that they were all making a far higher rate of interest on the capital invested in his business than his company did and he proved his point with facts and figures.

He pointed out that the service his company rendered had something to do with the business in the community. He did not plead, he did not threaten. He showed no fight. He simply put squarely before them a straight business proposition. He showed them where the low rates were leading his company and the only way to save the situation was for them to put up the money then and there.

At first these men demurred. They had no desire to put their own money into the company, especially under the conditions that existed then. The manager merely showed them what would happen if they did not and how this would affect their own business and then informed them that it was up to them. The money was raised.

Talking business to these business men in that manner made them see that company in a new light. Incidentally, after they had put some of their own money into the enterprise, they were more anxious to see that it got a fair deal and it became much easier to secure the rate increase it was necessary to have.

That old saying of "Tell your troubles to the cop" applies to the gas business, but in our case it's the public we seek out as listeners. Now is the time to begin, not tomorrow.—Editor.

Where Opposition Comes From

Fighting always stirs up opposition. The harder the fighting, the greater the opposition and the more difficult it becomes to gain any concessions on either side. That was the case in this instance. Some of the business men afterwards told this manager that if he had put the proposition up to them in the beginning in the manner that he did in the end much of the trouble the company experienced would have been avoided. Many of them had considered it necessary to fight the company because since it was fighting they felt that if it could possibly get more than was its due, it just naturally would.

Pleading results in more or less contempt. A salesmanager who was very successful in getting the best results from his men used to impress upon them that the beggar rarely gets more than a dime but that a business deal often involves thousands and it may involve millions. He always cautioned them never to beg for orders but always to make sales in a straightforward business manner.

Pleading always gives the impression that one wants something for which he does not expect to give an adequate return. One evening the vice-president of a railroad was making a speech. His talk proved to be a half hour of pleading for the railroads. He wanted higher rates. He wanted people to ship more by rail and less by motor truck. At no point did he show that it was good business to do so. His talk was not a business talk. It was a plea.

That talk had a very bad effect upon those who heard it. Instead of being better friends of the railroad they were more bitter enemies and most of those

men present were good business men. If that vice-president had made a good business talk, if he had shown those men how it was to their advantage as well as the advantage of the railroad they would have been with him. He, however, made the fatal mistake of asking them to help the railroads whether they helped themselves or not. That railroad no doubt does need an increase in rates but on account of the amount of the pleading it has done it must fight every step of the way.

Both pleading and fighting are exceedingly poor salesmanship. A fight almost always costs more than is won, and pleading leads to more contempt than pity. The man who comes into the office of the manager of a gas company and states that he is going to have a job there or he will beat up the manager, will usually have to make good on his threat. It is quite certain that under any circumstances he will not get the job. No matter how good a fight he puts up he will lose out. He may land in the police station.

The man who comes in and tells about the wife and seven hungry children that he has to support and therefore must have a job may get something to do, but he won't get a high salaried position carrying with it responsibility and standing. He has begged for his job and he is given the mite that ordinarily goes to the beggar.

Talking Business

When a man comes in, however, and sells himself to the company, when he shows beyond a question of a doubt that he will be worth a great deal to the company, he gets the position he is after. He talks business and the man who talks business gets his reward. There are on the payrolls of every large concern many men whose chief qualification for success is their ability to talk business at any and all times. These are the men who forge ahead. There may be others lower down in the ranks who have more latent ability than these successes, but those lower down are either fighters or pleaders and not business men.

There is no essential difference between a corporation and an individual in this respect. The concern that pleads never gets anything but the crumbs. The one that fights usually fails to get what it fights for. The one that talks business is going to get all that it goes after. Sometimes it gets more. Show a man or a group of men that it is good business to do that which you want done and it matters not whether it is the buying of a book, the taking out of additional life insurance, or the raising of the rates of the gas company, if the talk has been presented right that is going to be done.

To-day gas companies are facing graver problems than ever before in their history. To-day also seems a very opportune time to solve most of them. A year or two ago no one wanted to talk business or listen to business. All they wanted was all the profit that could possibly be made and they cared nothing about any one else unless that person could show them how to make still more profits. That stage has passed. People have sobered down a bit and most people are willing to listen to reason.

Arousing Interest

It is time to talk business. If people want low rates and no rate increases show them that the only way these rates can be maintained is for them to invest their money in the property at a very low rate of interest. If there are standards for gas that are maintained that keep up the cost of gas making, show them why this is the case. Talk business. Give them an opportunity to choose between a gas that can be manufactured at lower cost or the present gas at a higher rate.

Business is a give and take affair. The most satisfactory business deal is the one where each side profits to an almost equal extent. The man who gets the most for himself or for his company is the one who is able to show how the other fellow will benefit at least as much as he by doing what he wants him to do. When it is absolutely necessary to get something, it is often hard to realize this but there are many men who owe their success to that ability they possess of always talking business and never pleading or fighting.

Not until that utility manager mentioned at the beginning of this article got right down to brass tacks and talked business to the business men in his city was he able to accomplish anything. Before he got through with his business talk, he had convinced them that it was more to their own advantage to put up the money needed than it was to his company. They put it up as a matter of business, to help themselves and not to help him. Nothing else could have moved them. No amount of threatening, fighting or pleading would have won what he wanted.

Every one has his troubles. He doesn't want to listen to those of any one else. Most people can't be made to understand that such a concern as a gas company could have any troubles. The business men in town, at least, however, understand business talk. They are willing to listen to it. What they are for usually goes through. What they are against ordinarily does not. It therefore is highly important when talking to them that the talk be a business talk. It is necessary to show them in no unmistakable terms that the proposition suggested will benefit them. It is necessary to give them facts they can verify for themselves. Above all, it is wise to bear in mind always that it is their own businesses and not the gas company that they are interested in. Unless the rate increase, the new standard of gas the new system of rates is going in some manner to put more money into their cash registers it is mighty hard to arouse their enthusiasm.

Show these men that a readiness to serve rate system for gas will enable the company to sell gas at such a price that new industries will be attracted to town and the people brought in by these industries will make business better and they will boost for that rate system. Show them it is necessary to keep the company from becoming insolvent and they will call the whole thing a bluff. This is what is meant by talking business. Show the other fellow how the proposition is really going to benefit him and there is no need to fight or plead.

Every angle of the sales situation is discussed in the next issue of the AMERICAN GAS JOURNAL. Plans for getting new business, how to hold on to your present customers, and just what the appliance field has to offer are taken up by well-informed writers. J. Norman Lynd contributes also another of his great cartoons. You will want to read every line of it. Pass it around when you have read it.

Needs Immediate Relief, Says Company

Indianapolis Gas Company in Serious Plight

Characterizing its petition for an increase of the basic rate from 60 to 90 cents a thousand cubic feet as a "life and death matter," the Citizens Gas Company, of Indianapolis, late last week opened its case before the Public Service Commission of Indiana. Thursday and Friday of last week were taken up with the earlier testimony in the case and then the matter was adjourned until Thursday of the present week, at the request of the city of Indianapolis, in order to obtain time for the digesting of certain evidence introduced. This delay was protested by Henry H. Hornbrook and J. Dorsey Forrest, attorney and general manager, respectively, of the gas company, on the ground that delay in the matter now is a "life and death matter" to the company.

Much of the testimony of the first two days' hearing before Commissioner Glenn Van Auken came from Indianapolis business men, particularly those in touch with financial market conditions. All of this testimony pointed towards the fact that without rate relief the Indianapolis gas utility would find it almost impossible to market further securities, except at most disappointing discounts.

It is a conclusive array of facts that the Citizens Gas Company of Indianapolis presents in its fight for relief. The interest in this case is so widespread that a full report is published in these columns.—Editor.

These men also indicated that 60-cent gas in Indianapolis is no longer practicable under existing conditions. At the early hearings, Samuel Ashby, corporation counsel for the city of Indianapolis, sought to show that there is a general effort on the part of financiers to get the gas company away from the low rate of 60 cents a thousand feet. He also sought to bring out that the company has successfully emerged from three business depressions as serious as the present one.

After Mr. Hornbrook had completed his introduction of detailed testimony in the case, through Mr. Forrest, he called to the stand trustees and directors of the company to make a general showing of business conditions. Henry W. Bennett, president of the State Life Insurance Company, and a director of the gas company, testified that it is impossible to finance the gas company on its present 60-cent basis.

He said that the 90-cent basis would not be sufficient to make both ends meet unless business conditions return to normal very soon. He said that payments due in May made it imperative that the company devise additional financing.

Mr. Ashby questioned Mr. Bennett to bring out that the lowest period of business depression had been passed, but Mr. Bennett would not yield to this belief any further than to say he hoped that it had passed but that sometimes he felt as if the bottom had not yet been reached. He said that only "a general spirit among business men of indulgence and accommodation will save us from the worst." Mr. Ashby tried to bring out that in 1919 the company had been hit by business depression as badly as now, but that it came out all right. Mr. Bennett would not agree that the conditions then were quite as bad as now. There was much talk of how financiers keep telling the gas company that it could not hope to be backed better financially as long as it sells gas at 60 cents a thousand cubic feet. Mr. Ashby inquired:

"Isn't it a fact, Mr. Bennett, that there is in financial circles an effort to discredit 60-cent gas?"

Mr. Bennett, in spite of persistent questioning along this line, would not say that he knew of any such effort. He said he owns $10,000 of gas company stock.

G. A. Efroymson, president of H. P. Wasson & Co. and treasurer of the gas company, testified that the general business depression struck the gas company several months later than ordinary businesses. He said this is the third depression period that the company has gone into since his association with it. He said that sentiment had had much to do with holding the company down to a 60-cent rate. He said that as long as the coke business was good the company did very well, but that when the coke business fell off the company was hard pressed. He said the figures showed the company had not made "any money to speak of to take care of the needs of the community." He explained the company had been unable to accumulate a sound surplus and had gone into the present depression without adequate resources. He said that if the gas company had been run as an ordinary private business it would have shut down some time ago and awaited better conditions, but owing to the nature of its business it could not do so.

"As business men," said Mr. Efroymson, "the situation last fall looked very bad, and as business men we would have shut down or curtailed the company's activities, but as directors of the only gas company in the city we were there to look after the safety of citizens."

Need Higher Rate

He said that even with a 90-cent rate, the company will encounter difficulty in selling stock to finance the accruing obligations. He said the company should have requested a higher rate.

Mr. Ashby brought out in examination of the witness that the company had safely emerged from three similar depressions since 1914 and that the company now has no operating deficit. Mr. Efroymson said he owns $500 of stock in the company.

John R. Welch, president of the company, testified that the company officials have been told many times by financiers that the company can not enjoy substantial credit unless its revenues are increased. He said that the company has not kept its plant and system apace with the growth of the city because it has had insufficient revenue. Mr. Ashby asked him how the company proposes to finance itself if it should get a 90-cent rate, and Mr. Welch replied that first the company would offer more stock for sale and then would increase its bond issues proportionately. He said he owns $4,700 stock in the company.

Franklin Vonnegut, president of Vonnegut Hardware Company, and formerly president of the gas company, said that he has observed the retail business picking up a little but the factory business has not improved. He said a departure from 60-cent gas is "imperative." If a higher rate cannot be obtained, he said, the company cannot finance itself, and "then the next move will be to turn it over to the city and the city is in no condition to take it over." He said that the company should have gone to the commission months ago and asked for a higher rate, but that it wished to wait until the need of more revenue clearly had been demonstrated.

Mr. Ashby brought out from him also that the company had weathered several financial storms and still is going along without a deficit.

G. A. Schnull, president of Schnull & Co., and a director in the gas company, said that he always had supported a low gas price because it is a good thing for citizens and also a great advertisement for the city. He said that conditions now require a higher rate but that, "of course, as soon as business is better the rate should be lowered again." He said that 60-cent gas is fine as long as the company "can hang on," but he was of the opinion that the company cannot hang on much longer without more revenue.

In closing his testimony Mr. Forrest said that among other needs of the company is better office accommodations. He said that the office facilities were designed by the Indianapolis Gas Company to handle a business much less than now is handled and that the congestion in the business office is annoying both to the company and the public. He said it is one of the greatest causes why the public has expressed so much dissatisfaction with the gas company.

One of the most pressing of the immediate problems of the company is that it must now, when the coke market is off, keep on producing coke in order to produce sufficient gas for the public, said Mr. Forrest.

Mr. Forrest asserted that on March 1 the company had 40,000 more tons of coke in storage than March 1, 1920. He said the coke is worth $10 a ton.

He testified that in the first fifteen days of March the company produced 22,000 tons of coke in producing a sufficient quantity of gas and sold only 15,000 tons. He said that coke after a short time in storage is unfit for foundry use and then can be sold only for domestic consumption. Only a revival of normal business conditions can relieve the situation, Mr. Forrest believes.

"We are caught here by world-wide conditions," said Mr. Forrest in explaining how the market for ammonia, benzol and other by-products "is all shot to pieces."

Among other troubles of the gas company is its tax increase. The 1919 tax was given as $204,000 and the 1920 tax was $287,000. When business is depressed, Mr. Forrest testified, the company must tie up a large working capital in stocks which must be stored.

Mr. Forrest said the company had been "financed on a shoestring," and that it "has never had a comfortable margin in times of stress, and, of course, the burden becomes harder to bear as time goes on."

In the next forty-five days the company must meet approximately $500,000 of major items, such as taxes, maturing obligations and other charges, and, Mr. Forrest testified, the company has no means of paying the charges except by selling securities. He said the company, in addition to its regular outstanding indebtedness, has outstanding $800,000 small loans and $360,000 trade acceptances. He said bankers told them that the company can dispose of no more bonds advantageously unless it can establish greater confidence in its credit by means of higher gas rates.

"It is not our idea," said Mr. Forrest, "that this increase in rates is to go into capital. It is impossible to finance improvement without the higher rate. If we could not hope for better business conditions soon, the 90-cent rate would be insufficient."

Mr. Forrest said that while the company may be topheavy with bond issues, the company can advisedly sell no more stock unless it gets on a firmer income basis.

"We don't know how we're going to lay mains ordered by the board of works for this year," Mr. Forrest said, "for we don't know even how we are going to make both ends meet on operation alone."

Explains Shortage

Mr. Forrest said the gas shortages of several winters were due to both lack of equipment and an unprecedented demand for gas. He said the demand for gas was due to its low price compared with coal and other fuel prices.

Good gas practice, Mr. Forrest said, requires gas storage capacities equal to twenty-four hours' demand. He said the company's storage capacity is several million cubic feet less than its twenty-four-hour demand.

At the opening of the hearing on the company's request for authority to raise its rate from 60 to 90 cents a 1,000 cu. ft., H. H. Hornbrook, attorney for

the gas company, presented a picture of a public service corporation in dire distress. Samuel Ashby, corporation counsel, pictured the company as having just closed the most successful period of its history. After the opening statements the witnesses delved into the figures.

The company at the beginning of the hearing filed a supplemental petition. The original petition, filed in December, asked for higher rates because, it was averred, the company needs the money to make needed betterments. It declared that an emergency exists.

Whether such a situation could constitute an emergency within the meaning of the law which permits the commission to hear such cases in spite of franchises has been a question. In the supplemental petition, however, the company avers that "there has been an abnormal depression in business," which has reflected seriously in the volume and prices of sales, and that for three months the company has been operating "at a large loss." The supplemental petition avers that the company is in immediate financial distress because of refunding obligations it faces in May.

In his opening statement, Mr. Hornbrook said the company is losing $100,000 a month, without provision for dividends, and that the losses rapidly are wiping out the surplus of the company. He said the company really needs a 90-cent rate, and that it request for a 90-cent rate was not made merely in hope of getting a compromise 75-cent rate.

"A 90-cent rate," said Mr. Hornbrook, "will only be sufficient if there is a revival of business much sooner than any of us expect. In order to provide Indianapolis with gas we are forced to make coke we cannot sell. We are losing $100,000 a month. We have $800,000 of current loans to care for aside from our bonds and we have $1,500,000 tied up in coal and coke we cannot sell. There will be $350,000 of our 7 per cent mortgage bonds to retire May 1. Our taxes will be between $140,000 and $150,000 and we have other charges to meet. We cannot provide the money to meet the demands without selling some of our securities."

The higher rate, it was argued, is necessary to make an earning showing sufficient to attract capital to the sale of securities. He said only two cities in the country of more than 100,000 population have a rate as low as 75 cents, and that in both of those places there are petitions on file for increases. He said that in Detroit, where it was said the situation is somewhat comparable to Indianapolis because gas is produced there also by a coke plant, that the rate recently has gone to approximately 88 cents. He explained that "not an extra penny" could go to stockholders of the company because of an increase from 60 to 90 cents in Indianapolis.

Mr. Ashby, in his opening speech, said he recalled that last fall when the company was before the commission talking about an emergency rate on account of the gas shortage, it was then the contention of the company that the increase was requested only to put a check on certain misuse of gas and to provide more equitable distribution in a time of gas shortage. He said that the company's officials at the time said the company did not need a higher rate for any financial reason, but only for the distribution reasons.

Mr. Ashby said the report of the company June 30, 1920, said that its "operation has been exceedingly satisfactory" and that the "net profits had been higher than any previous half-year in the history of the company."

"It is a fact," said Mr. Ashby, "that 1920 was the best year the company ever had."

"The first ten months of it," interrupted Mr. Hornbrook.

Successfully Weathered the War

Mr. Ashby said the company had gone through the war period on its present rate, and that now when prices are declining it should not ask for more revenue. He said that the city recognized every public utility's right to earn reasonable profits. He said the coal price rise had not affected the gas company as it had other public utilities, because when coal went up the products of the company, such as coke, tar and ammonia, went up also.

Mr. Hornbrook explained that the company's good showing for the last two years, up to about three months ago, was due to aid from the Government in the way of payments for canceled contracts and other transactions as a result of the war. Otherwise, he said, the company would be in a worse financial condition to-day. He said that if the company had filed an original petition to-day, instead of in December, it must have asked for a much higher rate than 90 cents.

Mr. Forrest, who is secretary and general manager of the company, was the first witness at the opening of the hearing. His testimony had much to do with the historical side of the company and the events leading up to the petition much of which has heretofore been printed in the JOURNAL.

Coke Sales Helped

Mr. Forrest explained that low-rate gas in Indianapolis is possible only because the company primarily manufactures coke and because gas is a by-product. He said the stockholders of the company do not control the company, but that it is managed by a board of trustees, and that dividends of more than 10 per cent may not be paid. He said that when the company accumulated a surplus in addition to the limited dividends the surplus, according to the company's organization agreement, must go first to pay debts, next to cancel stock, and that when all stock has been canceled the plant is to be turned over to the city.

He said the company lacked only $125,250 of having paid the maximum 10 per cent dividends on stock since it began business. He explained that because of some stock sales at above par the 10 per cent dividend amounts actually to about 8¼ per cent on cash invested. The total $2,000,000 outstanding stock of the company netted $2,418,711, Mr. Forrest testified.

Mr. Forrest said in a coke-gas plant like that of his company it was necessary originally for the coke business to pay for the coal, for the by-products, except gas, to pay for the remainder of the operating expenses and for the gas to pay for all other charges such as capital charges, taxes, interest and such charges. He said that under present conditions coke sales must bear 25 per cent more of the operating expense than the cost of coal.

When dividends declared, but not yet paid, are taken out of the company's treasury, Mr. Forrest

testified, the company's surplus will have been reduced to $10,000. He testified that the company has $802,000 in its depreciation reserve. Questions from Mr. Ashby brought out this, and also the fact that the money is not set aside, but is absorbed in the general funds of the company. Mr. Forrest said the working capital of the company is so large that liquid assets of the company always are sufficient to meet needs out of the depreciation account. He said that just now the depreciation account is absorbed in the coal pile.

According to testimony the company's yards are piled high with coke it cannot sell, and that it is this situation that has resulted in serious falling off of revenue.

Company Has Been Frank

"Officials of the gas company have come before this commission and have put all their cards on the table to ask for a living operating rate only," asserted Gustav A. Schnull, who appeared to press the petition for increase. Mr. Schnull is a trustee of the Citizens Gas Company and president of Schnull & Co., wholesale grocers.

After being questioned on general business conditions and the financial situation as it affects the gas company, Mr. Schnull declared that its officials, considerate of the best interests of Indianapolis over their own private interests, kept the 60-cent gas rate here for sentimental reasons.

"In addition to being the best advertisement possible for the city, the 60-cent rate has saved the people of Indianapolis millions of dollars," said Mr. Schnull. "When these public-spirited men come before the commission their purposes should not be questioned."

"If things continue as they are," said Franklin Vonnegut, a director, "the next move will be to turn the plant over to the city and I don't believe the city is in position to take it."

One of the interesting points in the discussion was pressed by Mr. Ashby as to whether the gas company has withheld from its surplus account income distributions which may belong there and whether it has improperly distributed such money among other accounts, such as various types of reserves, and the depreciation account.

One of the distributions about which Mr. Ashby raised a question was that of $569,000 which might have been in the company's surplus, but which had been placed in another account for engineering expense. He did not pursue his questioning far along this line, however, but requested the postponement of the hearing.

Earlier in the afternoon Mr. Ashby questioned Mr. Forrest about the use of gas in coke ovens, and brought out that from 50 to 60 per cent of the oven gas generated by the company is consumed by the company itself, and that if this gas could be turned into mains for domestic consumption there would be plenty of gas for the city. Mr. Ashby raised the question of whether the company could use some other kind of fuel to heat its ovens and use the gas for consumer distribution only. Mr. Forrest said that the present arrangement is the best.

Mr. Ashby asked questions about certain royalties paid by the company to construction companies which provided it with equipment but made no adverse comment on the facts as disclosed.

Would Still Have Low Rate

If the Public Service Commission authorizes the company to increase the gas rate, Indianapolis, at the end of the year, still will have the lowest gas rate in the country, said Mr. Forrest, at one point in his testimony.

Mr. Forrest gave figures intended to show that plants in other cities where 75-cent rates are in effect soon will increase their rates to more than 90 cents.

Despite the fact that a 50 cent increase in rates is at stake, the hearing has been attended by only two or three citizens outside of officials of the company, the city and the commission. The only appearances entered were those of the company and city.

George C. Forrey, Jr., vice-president of the Fletcher American Company and a director of Breed, Elliott & Harrison, investment dealers, who has assisted in marketing gas company securities, testified that it would be "very hard if not impossible to finance the company except at a very high interest rate." He said the only place the company's income can be increased is by increasing its gas rates.

In response to questioning by Mr. Ashby, Mr. Forrey said he did not expect much better business conditions "until long towards fall." His testimony was similar to that given by other business men as to business conditions. He said he did not think there would be "a chance in the world" of selling any more gas company stock without a rate increase in prospect.

Commissioner Van Auken drew out from Mr. Forrey that gas company stock would not bring more than 80 per cent of par and its notes would have to bear 12 per cent in order to attract capital unless a higher gas rate obtains.

Mr. Forrest testified that the total par outstanding securities is $6,225,000, of an average sale rate of 101.75 per cent of par, yielding a cash realization of $6,332,739.26, with an average interest rate of 6.58 per cent.

Mr. Ashby questioned Mr. Forrest about the companys contract with the Domhoff-Joyce Company, of Cincinnati, which is the sales agent for the gas company. Mr. Forrest testified that the company pays the Cincinnati company 5 per cent commission to sell its coke and that the Cincinnati company guarantees accounts.

Mr. Ashby brought out that the company last year paid Domhoff-Joyce $275,000 in commissions.

"Coke takes a lot of selling," Mr. Forrest explained. He said the company cannot maintain an adequate coke sales agency as cheaply as 5 per cent commission to the Domhoff-Joyce Company.

Mr. Ashby brought out that in seven years the contract with the Cincinnati company cost the gas company an average of $115,000 a year.

Evans Woollen, president of the Fletcher Savings & Trust Company, testified concerning business conditions and difficulty in financing companies circumstanced as the gas company is said to be. His description of business prospects were somewhat more cheerful than other financiers who have testified and

(*Concluded on page* 281.)

The Distribution System*

Some Remarks on the Problems That Have to Be Met

By J. A. BROWN

Gas Engineer, Hodenpyl, Hardy & Company

It has evidently been considered by those who solicited this paper that a discussion of the Peoria distribution troubles and their remedy might prove useful as being representative of conditions existing elsewhere. There is nothing new or novel to describe; the Peoria distribution system, like that of most other towns of that size, was not designed, it just grew. The distribution system in a small town usually consists of plenty of good cast-iron mains of ample size, and troublesome pressure variations are usually unknown. Holder pressure is put directly to the mains or through a constant pressure governor. As the town grows, feeder mains away from the plant become necessary, until finally the point is reached where either for the lack of capital or by reasons of economy of operation, pressure boosting is started. At first this is only necessary in maximum hours and only low pressures are required; but as the output grows, greater pressure and longer hours become the rule until the boosting causes poor service because of high pressure in the parts of the town adjacent to the plant; or possibly it begins to cost too much.

It is right here that the decision as to the future distribution system in the town must ordinarily be made. This usually takes place when cities grow to 50,000 inhabitants or over. The decision may be delayed by boosting the pressure still higher and installing service regulators in the area affected by the higher pressures—this area expanding as the load grows. This may delay the decision many years. One town with which the writer is familiar has done this for fifteen years and now operates several thousand service regulators. Another method of delay is the isolation of some one feeder main from the plant to the distribution center and doing most of the boosting on that line.

These delays may be necessary for financial or similar reasons; but the point is that the decision as to what is to be the final plan should not be made without a careful engineering study. And while there are a number of methods of procedure, all of which have advocates and advantages, it is not my intention to attempt a textbook on the subject. The job is to get stared on the right method for your load, your town, your main system, and your pocketbook; or devise some means for delaying the start and meanwhile furnish the proper service.

In 1916 and since, the Peoria Company was confronted with the same new set of conditions confronting pretty generally all gas companies in growing towns. Their main system was loaded to capacity; their load had rapidly grown; labor and material were high in price and hard to obtain and no money was forthcoming to buy them with when the company's income was so entirely inadequate under existing rates. As was to be expected under these conditions, our service suffered and we soon found ourselves face to face with the gas company's paradox:

Better service necessary to obtain better rates; and,
Better rates necessary to obtain better service.

We were right at the above described point, where our low pressure system was no longer adequate without radical changes, which might not work out economically in the long run. I will describe what we did to relieve the situation.

Peoria is a long, narrow town along the Illinois River. Paralleling the river and about one mile back is a line of bluffs, where most of the growth in the residence section in the past fifteen or twenty years has taken place. About fifteen years ago Peoria had two gas companies with plants adjacent, and, of course, when these companies combined each had its own system of feed mains.

Booster System Inadequate

In 1917 our booster system became inadequate and we isolated one of the low pressure feed mains, 12 in. in diameter, as far as the center of the business section of the town and this aided for a short time. In 1919 conditions became such that it was necessary to make some extensive changes to get an adequate supply to the whole bluff district as our isolated main was no longer adequate, even when carrying two pounds pressure. An engineering study was made at that time and consideration given to the design of a feeder main system which would be capable of expansion and enlargement to meet any future demands. Plans were laid out for, and estimates made of the installation costs of low pressure mains along with medium and high pressure mains.

Location of High Pressure Lines

The high pressure lines were primarily designed to furnish service to the residence portion of the city located on the bluffs, where, of course, the peak loads are more pronounced. Larger low pressure mains leading from the plant are retained and furnish service to the business section of the city, which load, of course, is more steady. At present pressures up to five pounds may be carried on these lines by means of steam engine driven positive blowers located at the plant.

Whether the pipe should be steel or cast iron, the sizes decided upon, and the relation of fixed cost to the pumping cost, is for a large part a function of the prevailing prices at the time the study is made. I will, therefore, not burden you with these comparisons.

The lines laid were steel pipe 10 in. in diameter, all joints except a few expansion joints being welded. The lines in use at present will deliver gas to the governor stations, which are located approximately one and one-third miles away from the holder and in the center of the residence district, at the rate of 400,000 cu. ft. per hour with five pounds drop in pressure. The present maximum hourly output is 250,000.

*Paper read at Illinois Gas Association meeting.

When the two lines are extended to their ultimate lengths of two miles and three miles respectively, their capacity will be, with five pounds drop, 250,000 per hour. As greater capacity becomes necessary the pumping equipment may be changed to compressors for delivering gas at higher pressures.

The pumping cost at present, with coal figured at $3.50 per ton, works out at 0.97 cent per thousand at five pounds pressure. With the compressors it is estimated that the cost will be 2.7 cents per thousand at fifty pounds pressure. The cost of the lines was as follows:

9,688 ft. of 10-in. steel pipe at $1.95 per ft.	$18,891.60
Labor laying and welding	15,208.18
Pumping equipment	10,910.64
Regulating stations	1,132.57
Total	$46,142.99

This equals $4.76 per foot, and is 75 per cent of the price of laying 20-in. cast-iron pipe the same year, the 20-in. cast-iron pipe being the size of low pressure main necessary to carry an equal amount of gas to the same locations with a reasonable drop in pressure.

We have here at least the beginning of a system which may be expanded to care for any anticipated needs. The cost has not been great; the service is satisfactory. There is nothing novel or new about it. It seems to be the logical "next step" for an overgrown low pressure main system such as this was. To talk about it is a good deal like talking about the weather. It is not advanced as anything worthy of copy; the same system is used in a very much more extended form in nearly every large city.

Use a Long-Distance Recorder

In operating the Peoria main system great dependence is placed on a long-distance recorder which has been designed and developed by a members of the Peoria company's organization. This instrument takes the form of a recording pressure gauge and is located at an outlying station. The pen of the gauge is attached to a mechanism for indicating the variation in pressure on a sensitive volt meter located in the pressure room at the plant. This instrument has been in use for a number of years and has proven most reliable.

Naphthalene a Problem

One feature of the "problem" in Peoria is not under ordinary circumstances found with the present distribution system, and that is our old friend Naphthalene. To be sure, it is made at the works, but once out into the main it becomes a distribution problem and there is none to dispute this. It has been present and troublesome in Peoria for years and it certainly played its part when the main system became loaded to capacity. In the past few years many of the ordinary expedients for alleviating this trouble have been resorted to; but along with the strengthening of the main system came the necessity of cleaning up all naphthalene deposits in existing mains. The deposits were not of recent origin but tests indicate that the plant was sending out all the gas would carry.

It has been the writer's privilege to be connected in an engineering and operating capacity with some recent small gas oven installations where the gas came from the carbonizing chambers at a temperature above the ordinary and so high that naphthalene was formed in quantities considerably in excess of that which could be carried in the gas through the plant and in the distribution system. In research work carried out by the holders of the Gas Fellowship maintained by the Michigan Gas Association at the University of Michigan it has been clearly indicated that hot tar will absorb and hold more naphthalene than cold tar. A scrubber was installed immediately at the outlet of the carbonizing chambers and so arranged that the condensed tars, the condensed liquor, or a mixture, might be overpumped. Tests were made to determine the effect on the gas quality and no appreciable loss in calorific value could be discovered. When the scrubbing was done with hot tar we obtained an almost complete absorption of the naphthalene from the gas.

Based on the above experience a hot tar scrubber four feet in diameter and thirty-six feet high was installed in the Peoria plant last year and since it has been in operation we have been sending out gas so completely free from naphthalene that our service complaints from this cause have decreased over one-third. Indications are that the older deposits are being cleaned up, as shown by simultaneous tests for naphthalene carried on at the plant and out on the distribution system. The tests at the distribution system will show naphthalene where the test at the plant remains clear.

To get back to the job of discussing "Problems of an Engineer in Selecting the Proper Distribution System," the writer is connected with twelve companies in cities ranging in size from twelve to one hundred thousand inhabitants, and there are few problems at all common to any of them. Each one has a problem to itself. It is not often that an engineer has an opportunity to select a proper distribution system. The job is to take what exists and make it as proper as possible. In this day of limited resources expediency has usually been the rule. Necessity has driven us to a closer study of our distribution systems and the increasing prices of the labor and material that go into them have promoted a greater economy in their use. Perhaps this is just as well and practices will change as the relation of operating costs to the fixed charges on these main systems change. In the future I doubt if we shall be as lavish in the use of cast-iron pipe of ample size as we have been in the past. These systems, comprising as they do approximately one-third of the total value of the gas company's property, are at best used to capacity only a few hours per day and we must lay our plans so that the existing system shall be utilized to a fuller extent than ever before. To accomplish this we must use higher pressures and more feed mains at higher pressures. The present service rules for pressures must be amended—not so that poorer service will result, but that regulations that prevent the use of higher pressures with no advantage to the consumer will be eliminated. For example, the hours of little or no consumption might be excluded when specifying the allowable variations. The average size of mains should decrease, not in-

(*Concluded on page* 281.)

Determining Requirements of Industrial Equipment*

Rules and Tables That Will Help the Salesman

By The Industrial Department of the Peoples Gas Light & Coke Company, Chicago, Ill.

To do justice to the above subject, which is of such magnitude, would require a book, and even then it would necessarily be so complicated that in many cases it would lose its real value. However, we will endeavor in this short paper to approach this problem as close as possible and present something of value. It should be remembered that the data given herein can only apply to cases in a general way; conditions of apparatus, as well as local conditions and methods of operation, will greatly influence the gas consumption and change the figures accordingly.

To treat this subject we will select ten different classes of appliances, each class to be representative of operations of similar nature:

1. Heating water and other liquids.
2. Steam boilers.
3. Varnish burners.
4. Coffee roasters.
5. Core baking.
6. Japanning.
7. Galvanizing.
8. Soft metal melting.
9. Brass melting.
10. Oven furnaces.

Every example given in this excellent paper and the rules laid down should be of great help to those who are called upon to solve the problems of the industries directly dependent upon gas. This is the kind of article that should be studied mighty carefully.— Editor.

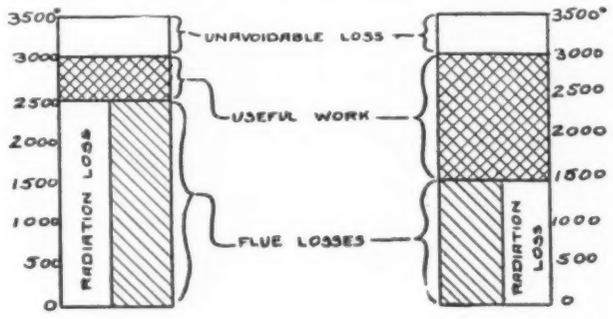
For simplicity let us establish a basis of figures to be used hereinafter: Gas at a heat value of 600 B.t.u. per cubic foot; cost of gas $1 per 1,000 cu. ft. To arrive at the real cost of operation, all fuels should be figured at the burner or on the grate. Gas is metered and delivered at the burner without any additional cost. The cost of coal as fuel is made up of a number of items: the initial cost, unloading, storage, labor of firing and removing ashes, etc. To the initial cost of oil also must be added the losses by leakage and evaporation, the cost of heating and pumping, reduction in volume due to separation of water and other unuseful matter contained in the oil as received. These items vary in all cases and usually add materially to the initial cost of the fuel.

When we talk about a cubic foot of gas containing 600 B.t.u. do we really get impressed into our minds what this means as a heating unit, or how we can use it to do work of different kinds? Let us get a view at it from a practical angle in useful work.

One cubic foot of gas is a volume 12 in. in three dimensions, under a pressure of 30 in. mercury above perfect vacuum and at a temperature of 60 deg. Fahr.

This volume is composed of various gases, of which some or all will combine with oxygen in burning, forming new combinations. This process evolves heat, which is measured by a standard called a British thermal unit, which is the quantity of heat absorbed or given up by 1 lb. of water changing its temperature 1 deg. Fahr. The oxygen required for combustion is ordinarily furnished by mixing the gas with air. Pure air contains 21 per cent of oxygen, the remaining 79 per cent being nitrogen, which is a dead weight in the mixture. To burn 1 cu. ft. of 600 B.t.u. gas, about 6 cu. ft. of air is required to furnish the necessary oxygen for perfect combustion.

This gives us, then, 7 cu. ft. of mixture, having also a heating value of 600 B.t.u. The heat developed by combustion will raise the temperature of this 7 cu. ft. of mixture to approximately 3,500 deg. Fahr.; that is, if no heat at all were taken away from it by surrounding bodies. This is called the theoretic flame temperature of a gas. Now, let us fix this picture in our minds, using figures as stated. The working unit of a cubic foot of gas equals 7 cu. ft. of mixture at 3,500 deg. Fahr. From this body we may extract heat, absorbing it by work and furnace lining. It is evident that it is physically



impossible to do work at a temperature of 1,750 deg. Fahr. at a theoretic efficiency of more than 50 per cent, the remaining 50 per cent being rejected in flue gases. In practice we find that the efficiencies of apparatus are far below this; 3,000 deg. Fahr. seems to be the highest temperature possible in a furnace of good design.

(*Continued on page 277.*)

*Paper read at Illinois Gas Association convention.

Notes on Manufacture of Water Gas*

Description of Changes Made with Additional Capacity

By GEORGE E. WAGNER, Madison, Wis.

During 1919 and the early part of 1920, the demands on the gas plant of the Madison Gas & Electric Company reached the point where it was necessary to begin arranging for additional manufacturing capacity. At that time the bulk of gas was made with one 8½-ft. water gas set with two 6½-ft. sets to help out when necessary.

The installation of an additional and larger machine required several changes in equipment at the plant.

The relief holder is about 250 ft. from the generator house and the gas was delivered from the water gas machines to the relief holder through a 16-in. underground pipe. Operating the 8½-ft. set to capacity under these conditions, puts a very appreciable back pressure on the machine. Increasing the amount of gas delivered through this pipe line would have caused excessive back pressure. This problem was solved by the installation of an overhead, welded steel pipe from the machines to the relief holder extending directly downward at the relief holder to connect with the underground inlet pipe to the holder. The overhead pipe is 30 in. in diameter and made of 1¼-in. material. To further reduce the possibility of excessive back pressure a connection was made between the inlet and outlet pipes of the relief holder. This connecting pipe line was equipped with a valve so that it could be shut off if desired. The overhead pipe has so much condenser effect that it has so far not been necessary to open the connecting line during normal operation. It may, however, be used advantageously if the inlet pipe to the relief holder should happen to be stopped up. The back pressure on the seal of the largest water gas set has so far not exceeded 13 in. of water column.

On account of the great distance between the generator house and relief holder, there is a possibility of the accumulation of large quantities of condensation in the connecting pipe line. In order to eliminate difficulties from this source the overhead pipe was so installed that one-half of it drains back to the seal of the new machine and the other half toward the relief holder. On the work's side of the 90 deg. bend where the pipe extends downward at the relief holder, there is a dam sheet about four inches high to stop the condensation from running into the holder inlet pipe. The condensation is then drained from the overhead pipe into an underground pipe line which carries it back to the tar well and separators. This reduces the condensation collected in the drip pot on the holder inlet pipe to such an extent that a small motor-driven piston pump keeps this drip clear without difficulty.

Fuel Storage

Another problem which had to be solved was that of fuel storage. Heretofore the fuel for the water gas sets was stored on the operating floor, which provided sufficient space to store enough coke for a night's run. The fuel was delivered on to the floor through a chute from a small hopper into which it was placed by means of the monorail crane used for unloading and handling all of the fuel for both gas and electric plants. The fuel had to be shoveled from the floor into buggies holding about 500 lb. each, which in turn had to be pushed on to the scales and then to the generator. Since this fuel storage space had to be used for the generator of the machine recently installed, it was necessary to make other provisions for fuel storage. This problem was solved by the installation of a 90-ton bin, of reinforced concrete and located directly under the monorail system and adjacent to the generator house. There is a roof over the coke bin extending also over the top of the monorail framework which keeps the fuel dry in case of wet weather. The capacity of the bin is sufficient to permit several days' operation in case of a breakdown on the crane.

The fuel is taken from the bottom of this bin through a 24x24-in. duplex cutoff valve.

The "I" beam extends directly under the center of the duplex valve, in order that the coke will be evenly distributed in the bucket. It was necessary to cut off the upper flange to provide clearance and prevent too much spread of the fuel. A piece of sheet iron is hung over the "I" beam to keep the fuel and dirt away from the track.

With the old method of fuel handling, it took about thirty minutes to make the first generator charge in the morning and several minutes to make each subsequent charge. It was necessary to use two and sometimes three buggies of fuel for a charge and it required considerable effort and time to do this work. After the charge the helper had to push the buggies back to the fuel pile, fill them, weigh them, and line them up around the coaling door with a view of eliminating as much delay as possible during the next charge. All of this work took nearly all of the helper's time and he was not able to do much other work. When it was necessary to run two machines at a time it was often impossible for one helper to supply the fuel for them.

With the present equipment the hard work is eliminated and the time reduced to a minimum. It now takes about five minutes to make the first charge in the morning compared with thirty minutes formerly. When the new generator is recharged the helper removes the generator lid and the gas maker lowers the coke spreader which is suspended directly above the coaling door and controlled by a counter weight and flexible steel cable. The helper then pushes up the bucket and pulls the little lever which releases the door and permits the fuel to slide out. When the bucket is empty it is pushed aside. The gas maker raises the coke spreader, the helper replaces the lid and the machine is ready for the next blow. It

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*Paper read at annual meeting of Wisconsin Gas Association.

American Gas Journal

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As the Journal Views It

The Same Old Bunk

It would certainly seem that somewhere at sometime somebody must have published a book that probably was entitled "A Handbook for Politicians." This conclusion is the result of a series of reports that came to hand recently. These reports were received from numerous towns and cities in practically every State in the Union and they told of meetings of the local governing bodies all intent on discussing the gas situation. Practically every speech that was made in all of these meetings, which, understand, were held hundreds and even thousands of miles apart, started off by declaring that the relief requested by the companies was only a step in a deep dyed plot on the part of the "gas barons" to secure a strangle-hold on the community.

So similar were these speeches and attacks in subject matter and even in verbiage that we were at once struck by the thought that they were taken from a book that had been especially published for the great and the near-great politician. Probably some of the chapters were headed: "Swatting the Gas Company," "How to Avoid Criminal Libel in Attacking Public Utilities," and so on ad infinitum.

But the really humorous part of the whole business is the fact that hard-headed newspaper owners who claim to be interested in the welfare of their communities devote much valuable space to these outbursts but none at all to the solving of the really vital problem that is theirs as well as that of the gas company. Somebody got started wrong in the beginning and as sheep follow a leader, even over a cliff, so we have the politician of to-day following the footsteps of their misguided and short-sighted forerunners.

It is time that this sort of bunk was squelched and the one way to do it is to turn on the light of publicity. Just get the idea properly planted in the minds of the public that they are being misled and it is a matter of only a short time until these demigods are shorn of their power.

Gas companies have nothing to conceal. Everything that is done can well stand the most thorough investigation that we know from our own experience. But unless the public knows this full well this condition is not going to react to the benefit of the community and the company. If these thoughtless politicians howl, just howl with them. It won't be long until they are silenced and the community restored to its proper equilibrium. Just try it out.

Taxation Again

Much has been written lately by economists who declare that this spring will see a building boom that past history cannot equal. They base their reasoning on the fact that both State and Federal officials in all parts of the United States are doing everything possible to encourage the builders to erect houses.

But there is one important point in this boom which seemingly has been overlooked by those who are behind the move. That is the gas company's situation.

One method of encouraging building which has been adopted in several States has been the exemption from taxes of houses erected during a stated time. But nothing has been done to relieve the tax situation so far as our industry is concerned. We are still called upon to bear the same old tax burden with the one possible exception that the same old burden has become doubled.

Now no matter the number of houses that may be built they are not inhabitable unless they are supplied with the necessities of life and certainly gas comes first. But gas companies cannot make the tremendous capital investment necessary to equip these new dwellings with services and meters. And the reason for this is the lack of funds.

This lack of funds has been brought about through the actions of the Government officials themselves and through the method of taxation that we now have. It is unreasonable to expect anyone to invest in gas company securities when even if they should pay a dividend a large proportion will be taken away through tax. And the likelihood of paying dividends is not so great as to cause a line to form outside of the company office, every person in that line being anxious to invest his savings in a property that has become a football for politicians.

It is time that we were granted relief from this oppressive system of taxation. It is time that public utility securities were exempt from tax. This may not altogether remedy the situation but it will be a step in the right direction.

Gas companies can do much in promoting this work by calling it to the attention of their consumers. It will not be long before it will bring action on the part of the elected representatives and gas companies will be relieved of another back-breaking burden.

Municipal Ownership Losing Out

Of late not much has been heard regarding municipal ownership. In fact, the advocates of this plan seem to have been silenced by the attitude that the general public has taken. Municipal ownership of public utilities has been described as a cure-all for the ailments of public service companies, but the failure of so many enterprises of this character has taught the public that it is a fallacy. It would seem as if the constituents of some public officials have raised their voices in no uncertain tones regarding this matter.

But despite this apparent apathy gas companies would do well to constantly keep before their consumers the dangers that arise from this form of ownership and operation. It has been said, and truly, that public utilities have reached a high state of efficiency in operation under private ownership and it has also been pointed out that there would be a radical change if the plants passed under municipal ownership and operation. Efficient executives most certainly would not care to remain with any company that was directed by politicians who primarily would be animated in their decisions by expediency of party. The hands of the operating force would be tied and it would mean that the party in power would use the company for its own ends.

The best method of operation is that which has grown up with the country and which has been such a force in the development of communities and the public generally realizes it. Now and again there is found an advocate of municipal ownership and once in a while we run across a community that would welcome the experiment. But a study of the situation reveals the fact, usually, that this attitude on the part of the public is due to the methods used by the company. But it is a peculiar thing that this attitude as a general thing is directed toward only one branch of the public utilities. Sometimes it is the gas company, or the electric light company with the street railways most often the target for the attitude. This latter condition is readily explainable. Whenever a man or woman misses a street car by a step or a car goes whirling past a corner, it is felt that it is a direct insult to the individual concerned. And at once that individual becomes an advocate for anything, even municipal ownership, provided only that the operating heads then in charge are thrown out.

But courtesy and persistent, efficient service will win out in the end and those companies which are under fire can readily overcome antagonism.

Determining Requirements of Industrial Equipment

(*Continued from page 273.*)

To get an idea of the various efficiences, we submit the following table, giving percentages of the heat input that are possible to be absorbed in the work:

Working Temperature (Deg. Fahr.)	Working Efficiency (Per Cent.)
3,000	0
2,800	6
2,600	12
2,400	18
2,200	24
2,000	30
1,800	36
1,600	42
1,400	48
1,200	54
1,000	60
800	60
600	72
400	78
200	84
100	90
0	100

The volume of products of combustion from 1 cu. ft. of gas is very close to the volume of the mixture and runs in heat-carrying capacity very close to the physical properties of air. The expansion in volume due to temperature is shown in the following table:

One cubic foot of mixture, or products of combustion, equals at a temperature of—

100 deg. Fahr.	1.00 cu. ft.
200 deg. Fahr.	1.03 cu. ft.
300 deg. Fahr.	1.17 cu. ft.
400 deg. Fahr.	1.53 cu. ft.
600 deg. Fahr.	1.88 cu. ft.
800 deg. Fahr.	2.24 cu. ft.
1,000 deg. Fahr.	2.61 cu. ft.
1,500 deg. Fahr.	3.50 cu. ft.
2,000 deg. Fahr.	4.38 cu. ft.
2,500 deg. Fahr.	5.29 cu. ft.
3,000 deg. Fahr.	6.17 cu. ft.

Heat absorbed to raise various substances 1 *deg. Fahr. in B.t.u.—*

1 lb. water	1.000
1 lb. copper	0.095
1 lb. steel	0.114
1 lb. cast iron	0.13
1 lb. lead	0.031
1 lb. tin	0.056
1 lb. zinc	0.096
1 lb. brass	0.094
1 lb. aluminum	0.198
1 lb. oil	0.56
1 lb. benzine	0.45
1 lb. brickwork	0.20
1 lb. stone	0.20
1 lb. sand	0.20
1 lb. coal or coke	0.20
1 lb. air (13 cu. ft.)	0.237
1 lb. fruit	0.92
1 lb. fruit, dried	0.84
1 lb. meat beef	0.68
1 lb. meat pork	0.51
1 lb. fish	0.82
1 lb. butter and cheese	0.64
1 lb. vegetable	0.91
1 lb. milk	0.90
1 lb. eggs	0.76
1 lb. olive oil	0.31
1 lb. wood	0.60
1 lb. ice	0.50
1 lb. asphaltum	0.40

Heating Water and Other Liquids

This is an operation for which only gas or solid fuel can be considered. Oil is not practical due to the low temperature in the combustion chamber, which makes it difficult to burn oil. Water and other solutions must be heated in many industrial processes. Under this heading we will consider those appliances where the heat is applied externally. The typical appliance for this work is known as a boiling stove, either round or rectangular in shape.

Standard appliances of this kind, up to 100 gal. capacity, are designed to bring the contents from cold to a boiling point in one hour. The efficiency runs about 60 per cent. To raise the temperature of 1 gal. of water in this type of appliance from 50 deg. Fahr. to 212 deg. Fahr. (boiling water) requires 3¾ cu. ft. of gas; from 50 deg. Fahr. to 140 deg. Fahr. (hot water) requires 1¾ cu. ft. of gas.

To maintain these temperatures without cooling by work requires one-third of the hourly consumption. Heat absorbed by the work must be added to the heat losses in the appliance.

Example—What is the operating cost of a 60-gal. tank in which 500 lb. of steel is treated and raised to a temperature of 212 deg. Fahr. from 70 deg. Fahr.?

Answer—

1st hr. heating up 60×3.75 ..... 225 cu. ft.

2d hr. holding temp. (1/3) 75 cu. ft.

Mat. $\dfrac{500 \times 142 \times 0.11}{600} = 131$ cu. ft.

2d hr. ..... 206 cu ft.

Note: 500—Weight of metal.
142—Temperature rise.
600—Heat value of gas.
0.11—Specific heat of steel.

With a cost of only about 20 cents per hour on an appliance of this kind, it is evident that gas is the cheapest fuel as compared with a coal fire and the labor connected with it. Although the bare fuel cost of coal might be less than one-half of this, the difference is more than offset by the cost of labor and dirt from coal and ashes.

Steam Boilers

Steam is used in many different ways for heat operations: by means of jacketed kettles, coils of pipe in open space or immersed in solutions, or steam is blown directly into the solution where additional water formed by condensation is permissible.

The standard appliance for generating steam is the gas-fired steam boiler. The average efficiency of this appliance varies from 65 per cent in the smaller sizes, under 5 h.p., to 75 per cent in larger sizes of 10 h.p. and 15 h.p.

A standard boiler horse-power is defined as 33,479 B.t.u. absorbed in water and steam, or the evaporation of 30 lb. of water from feed water at a temperature of 100 deg. Fahr. to 70 lb. of steam pressure, or the latent heat of evaporation of 34½ lb. of water at 212 deg. Fahr. The latent heat of 1 lb. of steam, either by absorption in evaporation or giving off in condensing, is 970 B.t.u. This is the amount of heat useful in heating appliances.

The gas consumption per hour of a boiler of a given horse-power (10 h.p.) having an efficiency of 70 per cent may be figured as follows:

$$\frac{33,479 \times 100 \times 10}{70 \times 600} = 797 \text{ cu. ft. per hour}$$

or 79.7 cu. ft. of gas per 1 h.p. per hour.

Rules for figuring horse-power required in various applications in industrial appliances follow:

First—Radiation in a room or inside of an oven at various temperatures of the surrounding atmosphere.

One square foot of radiating surface will give off 1.5 B.t.u. per hour per 1 deg. Fahr.—difference between temperature of steam and surrounding air.

Example—What is the horse-power required to supply 3,000 lineal feet 1-in. pipe coil (1,000 sq. ft. surface) in an oven of a temperature of 150 deg. Fahr., with steam at 10 lb. pressure (steam temperature 240 deg. Fahr.)?

Answer—

$$\frac{1,000 \times 90 \times 1.5}{970 \times 30} = 4.6 \text{ h.p.}$$

Gas required per hour: $4.6 \times 79.7 = 367$ cu. ft. per hour.

One boiler horse-power will carry the following radiation per hour in a room or oven of various temperatures, with natural circulation in still air or blowing a blast of air over the coils at different velocities. Steam temperature 240 deg. Fahr.; latent heat 952 B.t.u.; useful heat $952 \times 30 = 28,560$.

SQUARE FEET RADIATION

Temp. of Oven	Temp. Diff. 240—	Still Air	Blast. Veloc., Ft. per Min. 250	500	750	1000
200°	40°	475	248	164	98	69
175	65	292	152	100	60	43
150	90	210	110	72	43	31
125	115	165	86	56	34	25
100	140	135	72	46	28	20
75	165	115	60	39	23	17
50	190	100	52	34	20	15
25	215	88	46	30	18	13
0	240	80	42	27	16	12

Horse-power required to supply 1 sq. ft. of coil submerged in water of various temperatures with 10 lb. steam pressure (temperature of steam 240 deg. Fahr.):

Temp. of Water	Diff. Temp. Steam and Water	Iron Pipe Coils (h.p.)	Brass Pipe Coils (h.p.)	C'pr Pipe Coils (h.p.)
190°	50°	0.23	0.42	0.48
165	75	0.43	0.83	0.96
140	100	0.62	1.26	1.45
115	125	0.83	2.02	2.16
90	150	1.04	2.60	2.92
65	175	1.25	3.35	3.65

Jacket kettles are figured on the foregoing basis. Actual tests on a 50-gal. copper kettle gave the following data:

Initial temperature of water, deg. Fahr..	72	81
Final temperature of water, deg. Fahr..	212	212
Temperature raise, deg. Fahr.....	140	131
Weight of water heated, pounds.....	400	400
Gallons of water heated, pounds.....	48	48
B.t.u. absorbed in water.....	56,000	52,400
Steam pressure, pounds.....	10	70
Steam temperature, deg. Fahr.....	240	316
Time required, minutes.....	42	9

The latent heat (heat given off by condensing steam) of 1 boiler horse-power hour is at 10 lb. steam pressure, $952 \times 30 = 28,560$ B.t.u.; at 70 lb. steam pressure, $897 \times 30 = 26,910$ B.t.u.

To supply 56,000 B.t.u. to be absorbed in the water requires approximately 2 h.p.-hr. To this should be added 25 per cent for losses by radiation. It follows that a 50-gal. copper jacket kettle to boil water continuously every 45 minutes with 10 lb. of steam pressure requires 3 1/3-h.p. boiler. To boil water continuously every ten minutes with 70 lb. steam pressure requires 16.6-h.p. boiler. In practice we find that the time required to charge and discharge the material boiled gives the boiler a chance to recuperate. We recommend a 12-h.p. high-pressure boiler to furnish steam to a 50-gal. jacket kettle, or a 4-h.p. low-pressure boiler for slow work.

Varnish Burners

Varnish is made by heating a batch of "stock," consisting of gum, resin and oil, in a copper or iron kettle, mounted on a truck over a fire in the floor, to a temperature of 520 to 750 deg. Fahr. The kettles are about 36 in. in diameter and 36 in. deep. About 65 gal. of stock is heated per charge, to which lighter oils are added after the stock is removed from the fire, making about 150 gal. of varnish. This, of course, will vary somewhat in the different kinds of varnish made.

Varnish is highly inflammable when heated, and for this reason the boiling is done in the open bottom of a large chimney. Long flames are dangerous; therefore a blast gas burned is used with a short concentrated flame, or coke where solid fuel is used. We are using two sizes of special burners, one having an hourly capacity of 1,200 cu. ft. for slow and low temperature work and one having a capacity of 1,800 cu. ft. per hour where the work is forced.

Our test records show: Coke required to heat one batch of stock, 65 gal. (150 gal. varnish), to 580 deg. Fahr., 92 lb.; same work with gas, 910 cu. ft. Varying in practice, a batch is heated in from thirty minutes to two hours. These figures show initial fuel cost only.

Coffee Roasting

Coffee is roasted in revolving perforated metal drums usually holding two bags of coffee (260 lb.). Gas is applied in some cases externally under the drum, or in

other cases fire is applied internally through one end of the drum.

Soft blast burners give the best results. To roast one charge requires about thirty minutes.

Gas consumption on externally fired roasters is 300 cu. ft. per charge of 260 lb. in thirty minutes. Gas consumption on internally fired roasters is 180 cu. ft. per charge of 260 lb. in twenty minutes.

Japanning

The standard appliance for this work is an oven built of sheet-iron walls, containing insulation from 1½ to 2 in. thick. The temperature varies from 300 to 450 deg. Fahr. Some of these ovens are used for tempering springs, in which case the temperature is raised to about 600 deg. Fahr. The majority of ovens are direct-fired, by placing either atmospheric pipe burners or soft blast tip burners near the floor on each side of the oven. In others the gas is burned in separate compartments so that the products of combustion do not come in contact with the work to discolor it. These are known as indirect-fired ovens.

The average gas consumption is 1 cu. ft. per cubic feet of oven space per hour on 350 deg. work with a direct fire. In an indirect-fired oven we allow 1½ cu. ft. per cubic foot of oven space. A direct-fired oven for 600 deg. work will also require 1½ cu. ft. per cubic foot of oven space. These figures hold good in charges of average light weight, such as sheet-iron parts and light castings. For heavy work, over 1 ton per charge on a floor space of 100 sq. ft., an allowance should be made for heating the extra material. The time of baking varies from one to three hours in different methods.

We have test report on japanning hardware, as follows:

Weight of Material (pounds)	Gas Consumed in Cu. Ft.	Cu. Ft. of Gas per 100 lb. Material
1,348,774	655,800	48.6
1,537,193	763,400	49.7
1,646,739	875,340	53.2
1,819,672	1,132,290	62.2
1,805,418	1,039,320	57.6

The above work was done at 350 deg. Fahr. in direct-fired ovens and one hour baking time.

Galvanizing

Galvanizing is a process to cover iron parts with zinc to prevent corrosion. It is done by dipping the parts to be galvanized into a molten bath of zinc. Tanks used for melting are usually rectangular in shape, from 2 to 3 ft. wide and 3 to 4 ft. deep, varying in length from 10 to 24 ft. The best method of applying heat is on the side of the kettles near the bottom.

We have a year's record of a galvanizing plant in Chicago, from which the following data is taken:

Equipment—Two tanks, one 22 ft. long and one 12 ft. long, containing 63 tons of metal. This metal is kept hot during nights by a small fire throughout the year.

Nature of Work—Galvanizing rods and steel shapes, and general job work.

Weight of iron galvanized, pounds	9,210,000
Total gas consumed (day and night), cu. ft.	16,516,200
Metal added to bath, pounds	1,014,000
Temperature of bath, deg. Fahr.	850
Average gas per ton of material, cu. ft.	3,600
Average gas per 100 lb. of material, cu. ft.	180
Demand of gas per hour per 1 ton metal, approximately, cu. ft.	100
Demand of gas on a 40-ton bath, cu. ft.	4,000

Soft Metal Melting

Under this group we will consider standard appliances using a cast-iron pot and a blast-burner equipment, capacity 1,000 lb. metal and up:

1,000 lb. lead	200 cu. ft. gas
1,000 lb. zinc	1,000 cu. ft. gas
1,000 lb. aluminum	3,250 cu. ft. gas

The above figures are to bring metal from cold and melt is ready for pouring. If metal is to be held as in case of lead-hardening or pouring small amounts at a time, we have found the figures shown in table below to cover average conditions:

	——Cubic Feet per Hour——		
Deg. Fahr.	Lead	Zinc	Aluminum
600	100	..	..
700	115	..	..
800	130	350	..
900	145	380	..
1,000	160	420	..
1,100	175	460	1,250
1,200	200	500	1,500
1,300	225	550	1,750
1,400	250	600	2,000

Brass Melting

This class of work is done in open-hearth furnaces or in crucibles.

To melt 100 lb. of metal ready for pouring in an open-hearth furnace: Brass—366 cu. ft. of gas. In crucible furnace, capacity per charge 200 lb. or more: Brass—450 cu. ft. of gas.

The foregoing figures are for red brass, melting ingots, gates, scrap and borings, not to exceed 30 per cent, poured at a temperature of 2,200 deg. Fahr. In some cases a temperature of 2,600 deg. Fahr. or more is required for casting name plates, etc. To obtain this temperature requires up to 700 cu. ft. of gas per 100 lb. of metal.

Core Baking

Every foundry uses cores. It is of great importance that these cores are properly baked in order to be uniform and to have the greatest mechanical strength to resist the action of the metal poured around them in a mold. There are two methods of baking cores; one is called the "day oven" method. These ovens are arranged with drawer shelves on which smaller size cores are baked continuously all day. The baking is done in one hour to one hour and fifteen minutes. The gas demand on this type of oven runs approximately 1 cu. ft. per hour per cubic foot of space in the oven.

Another method is the baking of cores in "night ovens." These ovens are usually of brick, having racks or shelves for the cores, or else they are truck ovens. The trucks are drawn out of the oven on a track and loaded with cores, as they are molded during the day.

At night the truck and cores are drawn into the oven and baked during the night. The oven is heated for about four to six hours, and then the gas is turned out, leaving the cores in the hot oven until morning.

The gas demand for this type of oven averages about ½ cu. ft. of gas per hour per cubic foot of oven space. The time of heating is lengthened or shortened, according to sizes and shapes of cores. The temperature required in the ovens varies from 300 to 475 deg. Fahr.

Our records show the gas consumption on small cores not to exceed 5 lb. each:

On day ovens—
37,220 lb. cores....39,600 cu. ft. gas
19,305 lb. cores....23,200 cu. ft. gas

On night ovens—
Aver. 1 ton cores...1,500 cu. ft. gas

Oven Furnaces

Under this heading we will consider all rectangular fire-brick-lined furnaces, such as used in tool-rooms for die hardening, up to larger sizes used for case-hardening or other similar work. The design in general consists of a heating chamber suitable for the work; the work is supported by a fire-brick slab raised from the furnace bottom sufficiently to form the combustion chamber; below it a blast-burner equipment is used, with a number of burner tips on each side entering the combustion chamber.

The working temperature in this class of furnace varies from 1,200 deg. Fahr. for annealing to 2,300 deg. Fahr. for heat-treating high-speed steel. The method of operation also varies greatly; some work is done in thirty minutes and other work requires ten hours per charge. It is customary to figure the demand of gas per hour, as the quantity required to bring the furnace from cold up to the working temperature is thirty minutes in smaller furnaces and one hour in the larger furnaces. To determine the demand of gas per hour scientifically in each case would lead us into many difficulties, but the following table, computed from actual figures, gives the ratio between square feet of surface and cubic feet of gas per hour, and may serve as a rough-and-ready rule:

Required—The area in square feet of heated fire-brick walls framing the heated chamber, not including any interior construction, such as slabs or other supports:

Sq. Ft. Interior Furnace Walls	1,200° F. Working Temp. First Hourly Demand Cu. Ft.	Ratio	Holding Temp. Successive Hours Cu. Ft.	Ratio
5	120	24.0	65	13.0
10	180	18.0	100	10.0
20	300	15.0	165	8.2
30	375	12.5	210	7.1
40	465	11.6	250	6.2
60	540	9.0	300	5.0
80	600	7.5	330	4.5
100	700	7.0	400	4.0

Sq. Ft. Interior Furnace Walls	1,800° F. Working Temp. First Hourly Demand Cu. Ft.	Ratio	Holding Temp. Successive Hours Cu. Ft.	Ratio
5	200	40.0	110	22.0
10	300	30.0	165	16.5
20	480	24.0	280	14.0
30	625	21.0	390	13.0
40	775	19.0	425	10.5
60	900	15.0	540	9.0
80	1,050	13.0	675	8.4
100	1,200	12.0	800	8.0

Example—

12 x 24 x 30 furnace (working space)

Length of side walls.....30 in.
Hgt. of side walls (12+6)..18 in.
Width between side walls...24 in.

Two sides	7.5 sq. ft.
Top and bottom	10.0 sq. ft.
Front and back	6.0 sq. ft.
	23.5 sq. ft.

The ratio for 23 sq. ft. furnace surface and a working temperature of 1,800 deg. is given as 24 and 14, respectively.

$23 \times 24 = 552$ cu. ft. gas first hour
$23 \times 14 = 312$ cu. ft. gas succeeding hours

On a ten-hour operation (carbonizing 375-lb. charge):

To heat furnace—
$552 + 9 \times 312$ .....3,360 cu ft. gas

To heat material—

$$\frac{375 \times 1{,}800 \times 16}{600 \div 2 \times 100 - 300} = 360 \text{ cu. ft. gas}$$

Total .....3,720 cu. ft. gas

If the furnace temperature is only 1,600 deg. Fahr., the consumption of gas may be corrected as follows:

$$\frac{3{,}720 \times 1{,}600}{1{,}800} = 3{,}307 \text{ cu. ft. gas}$$

Records on actual test on the foregoing charge and size of furnace show a consumption of 3,218 cu. ft. of gas during a ten-hour operation.

The amount of heat in flue gases, which is considerable in high temperature work, may be used by recuperation or the preheating of the air, thereby raising the range of temperature before and after combustion to a higher plane; in other words, elevating it to a higher percentage of heat above the working temperature. In practice it is possible with good design to effect a saving of 20 per cent fuel when the air is heated to 50 per cent of the oven temperature. A furnace operating continuously for ten hours at 1,500 deg. Fahr. (oven temperature), with preheated air to 750 deg. Fahr., will require 20 per cent less gas than operating with cold air. The saving in fuel depends, of course, upon the point to which the preheating is carried.

In concluding this paper, we have not attempted to cover the field as completely as we would have liked to, as space and time do not allow us to go further into details. We have endeavored to give some useful information with the following in mind:

First—That we assume gas is burned under perfect conditions. This is not always found so.

Second—That we have a certain quantity and quality of heat, that we must use intelligently.

Third—This heat is produced by using a fuel of su-

perior quality, and therefore in its application all wastes should be avoided as far as possible.

Fourth—That the unavoidable losses in different operations vary greatly, and that it is of greater importance and more difficult to estimate the losses of heat in an appliance that the heat absorbed in the work.

Needs Immediate Relief, Says Company

(*Continued from page 270.*)

were summed up in the statement: "There now is less danger that conditions will get worse."

Mr. Woollen's testimony regarding the possibilities of further financing the gas company on its present 60-cent gas rate were similar to the testimony of others on the subject.

Mr. Ashby brought out that securities of the company are selling on the current market substantially above par.

Whether the $500,000 Federal Government war contract settlement with the Citizens Gas Company really prevented a deficit in the company's finances, as company officials say, or whether it merely took care of obligations created for war contract purposes was the subject of considerable questioning in the hearing.

Commissioner Van Auken questioned G. A. Efroymson, treasurer of the company, along this line for some time. He brought out that the company had made approximately $1,500,000 of improvements and had taken on that much additional obligations at the request of the State, which wished better gas service for company patrons, and at the request of the Government, which wished certain by-products of the company for war uses.

Then he brought out that the financial situation so resulting had been met by Government receipts and raised the question whether the gas company, apart from the whole war transaction, had not done very well.

Must Show Better Revenue Prospect

Arthur D. Brown, president of the Union Trust Company, testified that representations of the company concerning its finances make it inadvisable for any financial institution to attempt to deal with further stock or bond issues of the company until it can show a better revenue prospect from gas rates.

"You don't think the whole future looks gloomy, do you?" Mr. Ashby asked the witness.

"It looks bad. This world condition is pretty bad, especially on the other side of the water."

Mr Brown spoke of general business conditions and said:

"Until foreign trade is established there will be a very serious disturbance in business. We have the assets on this side, but they have the liabilities on the other side. We have as much money as we ever had in this country, but we have not as much credit. We had too much credit just after the armistice. Loans were made to everybody, especially to manufacturers."

Mr. Brown said that it would be difficult to dispose of gas company securities even at par in view of the company's financial representations. He said that banks all over Indiana are loaded up with paper, and that the same objection to buying stocks and bonds of the company would apply to notes the company might offer to meet the May obligations.

"I don't see how we can stay ahead of the sheriff unless we get relief," said Robert Lieber, a director of the company, when he took the witness stand. "The company cannot live without an increase in rates."

He blamed the reduction from 60 to 55 cents for 1914-1918 for what was said to be the present financial straits of the company. He said the increase from 60 to 90 cents should have been made eighteen months ago. Mr. Ashby said that if the increase had been made at that time the company would have more than $1,000,000 surplus at this time.

The Distribution System

(*Continued from page 272.*)

crease. The average size of mains in the twelve cities of which I speak is 4.84 in.; in 1910 it was 4.70 in. The sales per mile of main are 4.065 million and in 1910 they were 2.6 million, an increase of 57 per cent, whereas the increase in average size of main is only 2.7 per cent. Getting better? Yes; but our main system must be so designed that it will be increasingly so.

Another problem that some of our cities are confronted with is the large industrial consumer, whose load springs up almost overnight and sometimes falls away as suddenly. Such a load, if at all possible to carry on the existing main system, usually throws it out of all balance and special but not too expensive construction is necessary to take care of it. I have in mind such a load that has grown up in one of our cities. In this case one concern, removed from our holders by a mile but still in the populous part of the city, has increased its load from 6,650,000 in 1914 to 25,000,000 per month in 1920, and this load is 35 per cent of the total output. In this case it was taken care of by raising pressures on isolated mains and at the same time the remainder of the system was arranged so that these isolated mains might become high or medium pressure mains feeding through governors into the low pressure mains. I presume that this would be anyone's solution of the same problem.

I cannot refrain from again stating that there are very few "problems" in designing a distribution system that are at all common. Each city has its own problem and demands different treatment, depending on its existing mains, the character of the load, and the topography of the town. Certain it is that our distribution systems may be so designed that the average size of main may be less and the holder capacity necessary may be less. I have in mind one city where the average size of main required is considerably under the ordinary and the holder capacity about 30 per cent, this result being obtained by the use of a number of district holders.

I believe we are coming to the time when we shall not be able to lay down a few blocks of six-inch main because service is required in some newly developed residence territory, hoping that some day the main may be loaded to capacity; or to extend our twelve-inch line several blocks or half a mile because the city wants to pave and we are afraid to reduce the size because some day we may be sorry that we had done so. I know that a good deal of that sort of engineering has gone on in the past. Such decisions ac-

cumulating result in main systems costing two dollars per thousand annual output when they might have been built for less than one. Who does lay mains this way? Lots of mains are laid this way and I know that we cannot continue to so waste material and labor. How to avoid it? Get busy and make some real plans.

Notes on Manufacture of Water Gas

(*Continued from page 274.*)

takes a little more than one minute to make a recharge and have the blow on the generator again.

Saving Time

It takes the helper about two minutes to push the bucket under the duplex valve, fill it, push it on to the scales and weigh it. He then has the balance of the time up to the next fill for other work, allowing him time to watch the blower, the works exhauster, washer, cooler, and purifying boxes and clean the floors and windows on the operating floor.

The bucket is made of shet iron and is reinforced so that in case of wear it will be necessary to renew the inner lining only. The track scales have no space where fuel and dirt can accumulate and therefore provide an accurate means of weighing. The beam scales should work a long time without maintenance expense.

The New Gas Machine

The water gas machine recently installed is a ten-foot set consisting of a ten-foot generator, a nine-foot carbureter and superheater with an interlocking valve box for full hydraulic control. The interlocking valve box is a safeguard in case the gas maker should become confused and attempt to open the wrong valve.

The blast air is supplied by a direct connected, motor-driven fan type blower installed as closely as practicable to the set. The blower has a capacity of 15,000 cu. ft. of air against 45-in. pressure. There is a duplicate blower unit beside it with the outlets of the two blowers so connected that either blower can be used to operate any or all water gas sets.

The blast air is controlled by means of a butterfly valve regulated from a stand mounted directly beside the steam stand.

The arrangement of the operating floor is such that when the gas maker stands in front of the valve box he has all controls, hydraulic, steam, air and oil, in a small semicircle about him, and the gauges are all on the gauge board before him. The gauges include the oil-pressure gauge, up and down run steam gauges on the generator, carburetor, superheater and seal. The oil meter is on a stand adjacent to the carburetor.

During the initial operation of the new machine we had several experiences which are related here with the hope that the information may enable others to overcome similar difficulties with the least possible delay.

At first the machine did not make gas in the expected quantities. The trouble was attributed to wet steam, but the installation of a steam separator and trap made only a slight improvement.

Upon investigation it was discovered that the down run hot valve did not seat properly at this time. This permitted a quantity of air during the blow, and of steam during the up run, to pass directly to the carburetor. This formed a kind of short circuit on the generator and caused a reduction of the temperature of the fuel bed. Efforts to increase the temperatures of the fuel bed resulted in excessive temperatures in the carburetor and superheater. Proper adjustment of the hot valves showed a marked improvement in the operation of the set.

Further improvements in operation were brought about by readjusting the amount of air admitted to the generator during the blow. Instructions on the operation of water gas sets have generally emphasized the advantages of high blast pressure with the explanation that such increased pressures would increase the velocity of the air through the fuel bed and thereby result in greater capacities and increased efficiencies. But these instructions did not caution sufficiently against an excessive volume of air.

With our blowers we could get more than thirty-six inches of pressure under the grates, but with the pressure much below the maximum there were indications of combustion in the carburetor with the carburetor blast valve closed. Since combustion require oxygen, it was evident that there was free oxygen getting into the carburetor and the only possible way for it to get there was through the generator fuel bed. The fuel bed had a tendency to develop black spots, and black spots in a fuel bed should be avoided because they reduce the amount and the quality of gas made.

An attempt to operate with less generator blast air showed an improvement and it was then decided to ignore the blast pressure entirely. Efficient operation requires approximately 1,450 cu. ft. of blast air through the generator for 1,000 cu. ft. of gas made. The exact amount depends, of course, upon the kind of fuel and the condition it is in. When the blast air is reduced below these limits the capacity of the set is reduced, and when the air is increased beyond certain limits the efficiency is reduced, and when the air is increased too much the capacity is reduced as well. If the fuel contains considerable small particles larger quantities of blast air can be used.

The combustion of carbon requires oxygen which is derived from the air and brings with it larger quantities of nitrogen. This nitrogen is inert but while it passes through the fuel bed it absorbs a lot of heat. When excess air is used this nitrogen has a tendency to reduce the temperature of the fuel bed, largely, of course, on account of the formation of blow holes. The use of the correct amount of air is especially essential when a machine is started.

Removing the Clinkers

In regular operation we remove all clinkers, both side and bottom, in the morning, and remove only the dead fuel and ash on the grate bars in the afternoon. After the clinkers have all been removed it frequently happens that there is very little live fuel left in the generator. It is sometimes necessary to build a wood fire before charging with fresh coke. On the morning charge the generator is filled and the lid is left off until the fire has been forced through the fuel bed. The blow is then continued for several

minutes through the entire set. When the first run is put on the carburetor is not hot enough and for that reason we make only a blue gas run with very little steam. No attempt is made to run oil into the carburetor until the machine is hot enough. If the first blow is continued until the carburetor has reached working temperature, or if too much steam is used on the first run, there is apt to be a bad clinker.

We aim to make a second fill after the second or third run, not so much to add fresh fuel as to examine the fuel bed. During the initial blow the fire unavoidably comes through in spots or on one side. If such is the case the gas maker adds fresh fuel and is particularly careful to spread it over the bright spots. This has a tendency to make a more even fire. As a rule, there is a noticeable change in the next blow and increased make during the following run.

It is not possible to make a fixed rule regarding the relative number of up and down runs or the relative amount of steam to be used on up and down runs. That depends entirely upon the kind of fuels and the fusibility of the clinker.

We had several experiences which brought out the advisability of using the proper amount of air. When we changed from gas house coke to anthracite coal we had to watch the air more closely. Excess air decreased the amount of gas made while with the proper amount of air we could make more gas than with the coke.

Operation with hard Solvay coke required closer supervision than with gas coke, because the coke was larger. Here, again, the reduction of air to the proper amount increased the gas make.

Air Meter Useful

We have concluded from our experiences that an air meter is a very useful adjunct to a gas machine. Other meters are, of course, also essential for efficient operation. Much information and much benefit can be derived from recording gauges. Comparison of operation with or without the air purge at the end of the run indicated that the air purge was desirable and advantageous for uniform operation. If the air purge is run too long it increases the CO_2 and results in increased enricher requirements to maintain calorific standards. The correct time for purging can readily be determined by test. The simplest test is to light the gas from a jet cock on the machine, when the flame goes out the purge should be discontinued.

Efficient operation demands an even fuel bed and this requires that the fuel be spread properly. The most satisfactory method of spreading the fuel is with a coke spreader. All that is necessary is a plate which throws the fuel toward the outside and thereby prevents the accumulation of small particles at the center where they would make a dense fuel bed. It is very handy to have a throat or ring on the top of the spreader which acts as a funnel and prevents the fuel from spilling around the coaling door during the fill.

The superheater stack should always be equipped with a pilot light so that the gas maker can tell whether or not any combustible gases are leaving the machine.

A water gas set is not complete without pyrometers. While the thermocouple in the superheater is essential, one in the carburetor will also prove very helpful. The gas maker can regulate the temperature of the carburetor more closely with a pyrometer than by noting the appearance of the checker brick. This thermocouple should be installed near enough to the upper layers of brick to get the temperature variations, but directly at the top the temperature variations are too great and would cause the thermocouple to burn out in a short time.

The thermocouple should have a protecting sheath. If this sheath is closed on the inside end, the thermocouple loses its sensitiveness. The sheath should, however, extend several inches beyond the end of the thermocouple to protect it. When a gas maker is operating with pyrometers it is advisable to make trowel tests at frequent intervals as a check on the temperatures.

In case of trouble with a water gas set it is frequently possible to gain much information from a test for CO_2 content. While the complete analyses are very desirable, the information obtained from CO_2 test is frequently sufficient. It affords a check on the condition of the fuel bed and also indicates whether the fuel bed has been carried too low, and can be used as a check on the air purge which is very desirable for uniform operation.

Gas Company Helps Fight Whooping Cough Epidemic

Great Falls, Mont.—To treat sufferers in Great Falls' epidemic of whooping cough, W. A. Bertke, general manager of the gas plant here, is having benches installed in the purifying room, where the oxide cure can be taken by children while they play.

The manner of treatment is simple. The children are merely allowed to play in the shavings of the purifying room and while at play inhale the fumes from what is known to the gas men as the "oxide." The fumes from this oxide contain the healing properties.

This oxide is composed of ordinary shavings, iron borings and lime, which collect the impurities of the gas, such as carbolic acid, ammonia, sulphur and other ingredients.

Taken from the big containers, the oxide is scattered over the cement floor of the room to allow the foreign gases to pass off before the oxide is used again. The children are taken to the plant and allowed to play in the shavings, and while they are enjoying their sport they get the benefit of the fumes.

The children are allowed to play from one to two hours in the shavings. On the first day the coughing spasms are noticeably shortened, and usually after the fifth or sixth day the spasms have ceased entirely. The general coughing wears away gradually after that.

Want Lower Gas Rates

Knoxville, Tenn.—The city commission will at its next regular meeting authorize City Attorney Beeler to file application with the public utilities commission for a reduced gas rate to correspond with the lower price of coal. Last year the company was granted an increase of 70 cents, making the rate net $1.80 per 1,000 cu. ft. Coal has since decreased several dollars per ton.

The city commission has been flooded with complaints recently from gas company patrons alleging that charges have even been quadrupled by the gas company with no noticeable difference in consumption.

Public Utilities Securities Market Report

Prices of Representative Gas Bonds

(Quotations furnished by The National City Company)

Company	Issue	Maturity	—Market— Mar. 24, 1921 Bid	Asked
American Lt. & Trac. Co.	Five Year 6s	May 1, 1925	89½	90½
Brooklyn Union Gas Co.	First Consol. 5s	May 1, 1945	76	76½
Columbia Gas & Elec. Co.	First 5s	Jan. 1, 1927	84	85
Consol. Gas, Elec. Lt. & Pr. Co. of Baltimore	First Ref. 7½s	Dec. 1, 1945	99¼	100¼
Consol. Gas, Elec. Lt. & Pr. Co.	General 4½s	Feb. 14, 1935	75	76
Consol. Gas Co. of New York	Sec. Conv. 7s	Feb. 1, 1925	99½	99¾
Consol. Gas Co. of New York	One Year Sec. 8s	Dec. 1, 1921	99¾	99⅞
New Amsterdam Gas Co.	First Consol. 5s	Jan. 1, 1948	59	61
Denver Gas & Elec. Co.	Gen. (now 1st) 5s	May 1, 1949	80¼	81¼
Detroit City Gas Co.	Gold 5s	Jan. 1, 1923	90	92
Equitable Illum. Gas Lt. Co. of Philadelphia	First 5s	Jan. 1, 1928	94	95½
Hudson County Gas Co.	First 5s	Nov. 1, 1949	74	77
Laclede Gas Light Co.	Ref. & Ext. 5s	Apr. 1, 1934	73¼	73¾
Louisville Gas & Elec. Co.	First & Ref. 7s	June 1, 1923	94	95½
Michigan Light Co.	First & Ref. 5s	Mar. 1, 1946	70	75
Milwaukee Gas Light Co.	First 4s	May 1, 1927	82¼	83¼
Pacific Gas & Elec. Co.	Gen. & Ref. 5s	Jan. 1, 1942	77¼	78
Pacific Gas & Elec. Co.	Col. Tr. Conv. 7s	May 1, 1925	96	97
Pacific Gas & Elec. Co.	First & Ref. 7s	Dec. 1, 1940	98	99
Cal. Gas & Elec. Corp.	Unif. & Ref. 5s	Nov. 1, 1937	84	84½
Peoples' Gas Lt. & Coke Co.	Refunding 5s	Sept. 1, 1947	70	71
Chicago Gas Lt. & Coke Co.	First 5s	July 1, 1937	72	74
Portland Gas & Coke Co.	First & Ref. 5s	Jan. 1, 1940	75	77
Seattle Lighting Co.	Refunding 5s	Oct. 1, 1949	64	66½
Southern California Gas Co.	First 6s	Nov. 1, 1950	84	86
United Gas Improvement Co.	Two Year 8s	Feb. 1, 1923	99¼	99¾
Utica Gas & Electric Co.	Ref. & Ext. 5s	July 1, 1957	76	78
Washington Gas Light Co.	General 5s	Nov. 1, 1960	78	79
Western States Gas & Elec. Co. of California	First & Ref. 5s	June 1, 1941	73½	75½

Companies Make Returns

Atlanta, Ga.—The Georgia Railway & Power Company, operators of Atlanta's street railway and electric suburban lines, the electric plant and the Atlanta Gas Light Company, has filed its return of its properties for taxation for 1921, the total sworn value of the properties being $18,816,762 the properties of the Atlanta Gas Light Company being valued at $2,602,462, the same figure as returned in 1920. The total for the whole properties is $130,000 greater than returned in 1920.

Other returns made by gas companies are as follows:

The Macon (Ga.) Gas Company returned $433,208, against $417,309 last year, an increase of $16,008.

The Savannah Gas Company returned $765,788, against $789,061 last year, a decrease of $13,273.

The Augusta Gas Company returned $348,651, against $348,400 last year, an increase of $251.

Would Allow Stock Sales Under Par

Boston, Mass.—The committee on power and light of the Massachusetts Legislature reported a bill to permit gas and electric light companies to issue stock at less than par, when, in the opinion of the Department of Public Utilities, the shares cannot be sold at par or above. The same committee reported a bill for the conservation, development and utilization of the water power resources of the State, which is similar to the act which was defeated in the Legislature two years ago.

To Sell Gas Plant

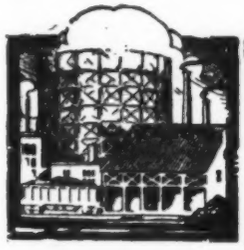
Fremont, Neb.—Disgusted with progress of the local gas plant, the Henry L. Doherty Company of New York City, owners and operators of the Fremont Gas Company, will offer the business for sale to the city of Fremont at the next regular meeting of the council. This is the climax between the company and the residents of this city in a war that has raged for nearly a year.

Petition for Rate Adjustment

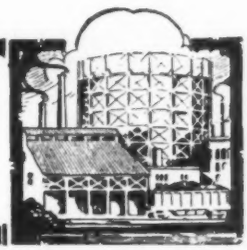
Beloit, Wis.—Three petitions signed by 409 persons asking for a readjustment of gas rates in the city of Beloit have been placed before the common council by Aldermen John Rindfleisch, Ed. Branigan and Wallace Poe. The petitions are as follows:

"We the undersigned consumers of gas of the Beloit Water, Gas & Electric Company respectfully petition your honorable body to request the State rate commission of this State for a readjustment and lowering of gas rates now in forces in this city."

The petitions were referred to a special committee comprising the judiciary committee, the city engineer and the city attorney. This action was taken by unanimous vote on motion of Alderman Branigan, seconded by Alderman Reynolds.



NEWS OF THE GAS INDUSTRY



Wisconsin Gas Men in Annual Convention

Many Important Subjects Discussed at Regular Gathering

Milwaukee, Wis.—With 250 delegates present, the joint convention of the Wisconsin Gas Association and the Wisconsin Electrical Association was held here during the present week. Chief interest rested this year in the talk of A. F. Davey, of the Sheboygan Gas Light Company, who discussed the effect of a reduced B.t.u. standard from the consumer's standpoint. The interest was aroused through the attacks carried on by the local newspapers who have waged a campaign against this reduction.

The fight against the reduced B.t.u. standard was taken up by the newspapers after scores of complaints had been received from women's organizations. The campaign reached its climax in a mass meeting protesting against increased rates and reduced heating units.

Following this protest meeting, which was held in Milwaukee the Rail Commission held a public hearing on these new rates and was called before the State Legislature. The commission following these actions flatly refused to reopen the case. At the present time there are petitions being circulated demanding that the Rail Board be abolished and these will be presented to the Legislature.

It has been maintained by officers of the Milwaukee Gas Light Company that the fault, if there is any, was not in the reduced standard but in the lack of equipment, stating that its building program had been interrupted by the war and that the present revenues did not allow it to either replace or add to its equipment. It was expected that definite action would be taken on this question by the association during the sessions.

There was a great deal of enthusiasm displayed by the delegates to the convention who expressed the hope that the present year would see definite action being taken on the part of those in office looking toward a solution of the many problems that are confronting the industry.

Oscar H. Fogg, secretary-manager of the American Gas Association, made the opening address on Tuesday, the first day of the convention. The full program was as follows:

A. D. Davey, Sheboygan Gas Light Company—"Effect of Reduced B.t.u. Standard from Consumer's Standpoint."

George E. Wagner, Madison Gas & Electric Company, Madison, Wis.—"Notes on Manufacture of Water Gas."

William F. Miller, Wisconsin Public Service Company, Greenbay—"Laying of 12-in. Submarine Main," with lantern slides.

Prof. O. L. Kowalk, head of department of chemical engineering, University of Wisconsin—"The Gas Industry, a Good Customer of the University."

Irwin C. Brenner, incumbent of gas fellowship, University of Wisconsin—"Laboratory Investigation of the Use of Hypochlorides as a Gas Purifying Material."

Business session—Election of officers.

Charles B. Scott, N. E. L. A. national safety committee; safety.

P. V. Prather, secretary, Great Lakes geographical division N. E. L. A.; public utility associations.

Frantz Herwig, director, the work of the Wisconsin Public Utilities Bureau.

The convention ended Wednesday night with a banquet in the fern room, Hotel Pfeister, when Edgar A. Guest spoke and N. J. Wheelan was toastmaster.

Gas Company Is Sued for $100,000

Louisville, Ky.—A re-echo of the explosion in a coal crusher at the Riverside plant of the Louisville Gas & Electric Company, was heard in the circuit court, when Charles A. Donohoo and Joe J. Hess, who were injured by the blast, filed suit for $100,000 against the company and the Greathaus Company, sheet iron workers, by whom they were employed. Three other suits were filed.

The men seek to recover $50,000 each on the ground that they were burned severely and permanently disabled by the blast. They were employees of the Greathaus firm and at work at the Riverside plant when the explosion occurred.

Officials of the gas company said that efforts had been made to "settle" the suit out of court. The cause of the explosion has not been determined, they explained. It is believed that the explosion was due to an accumulation of coal dust in the crusher. They admitted that the men had been injured by the blast.

Rome Gas, Electric Light & Power Company

Rome, N. Y.—The annual meetting of the stockholders of the Rome Gas, Electric Light & Power Company was held at the office of the company. The following directors were re-elected: VanHorn Ely, Henry J. Crowley, Victor N. Gurney, Walter W. Perkins, Edward Perkins, Fred M. Shelley and John D. McMahon. The inspectors of election were Johnson D. McMahon and Miss Winifred Weldon. The officers were not elected, as there was not a quorum present.

C. H. Nettleton Explains Need for Service Charge

Hartford, Conn.—A new flat rate for gas instead of the meter or service charges would cause big consumers to use other fuels and would ultimately result in bigger gas rates to the small consumer, Charles H. Nettleton, president of the New Haven Gas Light Company, told the legislative committee on the judiciary during a recent hearing on the bills which would prohibit gas and electric light companies from making the meter and service charges.

Mr. Nettleton said in part:

"Let me say frankly that the case of the very poor man using a small amount of gas and paying this service charge, appeals as strongly to the manager of a gas company as to the average man in this room, and if that were all there was to it I think the idea would be given up at once, so far as the gas companies are concerned. But that is a very small part of the question, and the small consumer is not always the poor man.

"The small consumer consists of occupants of offices whose lighting hours are limited; of occupants of all those places whether offices, stores or houses where a gas meter is kept as a reserve to be used when the electric light goes out, and I am happy to say it rarely goes out in New Haven; of landlords who use a little gas to light their halls; of theaters to light their exits. My judgment is that these account for far more of the small consumers than the poor man.

"'A service charge,' known also as a 'readiness-to-serve' or 'customer charge,' covers part of the cost of maintaining a gas installation connected to a system of mains with adequate gas supply ready for use. It also includes cost of meter-reading, office work, complaints and other expenses borne by the company independent of whether much, little or no gas be used.

"When not enough gas is used by one customer to pay these costs plus the cost of the gas itself, the difference, or loss, has to be paid by other customers in the price they pay for gas. If such losses were few they could be neglected, but investigation showed that a large number of installations used but little or no gas. Eleven thousand meters used for the year an average of about 1,000 cu. ft. each, or about $1.10 per year. Assembling all costs properly grouped as service costs showed a total average yearly cost to the company of over $10 per meter. Equity and justice therefore demanded the adoption of a service charge. Note that the charge adopted amounts generally to but $6 per year per meter.

"A low price for gas depends upon the number and extent of development of the large consumers. Ten per cent of the consumers use 40 per cent of the gas and they are the best profitable business we have. They have borne more than their share of the total expenses and will continue to do so with the service charge in effect. A flat increase in the price of gas equivalent in return to the service charge would restrict the large users and drive them to other fuels, and prevent the development of such business. This result would be reflected in still higher prices to all of the consumers. Besides consideration of fairness, therefore, the advantage of our consumers as a whole, is best served by the adoption of the service charge.

"Perhaps that gives in a few words the best definition of what the service charge means. I would like to go into some of the items. In a gas company all we can hope to do is to pay a dividend sufficient to attract capital when needed for extensions; extra dividends are probably tabooed in this State under a recent decision of our commission. If we make some extra money and it is proven we are likely to continue, the price of gas will have to come down. New Haven has 11,000 meters consuming annually an average of not over 1,000 ft. and each producing a total annual average income of not over $1.10; last year the gas cost the company 90 cents per thousand cubic feet, so that on each of these meters the company made a profit of 20 cents, and the cost of maintaining and being ready to serve with gas amounted to more than $10 per year for each consumer; some one has to pay the difference, $9.80, and in the long run it is the other and larger consumers. If they pay it, it means that they pay more for gas than they would pay if we are allowed to continue our service charge.

"Since Aug. 1, 1920, when the service charge was started, the New Haven Gas Company has lost over 2,000 meters; that is that many meters have been given up mostly because they were not worth to the consumer the monthly service charge. If 1,500 have been removed for that reason, I estimate the company will save at least $12,000 annually and this loss was being borne by the other consumers.

"If the service charge be not permitted, the cost for gas will amount to such figures that we will lose some of the 10 per cent of our consumers who use 40 per cent of our gas, and every time we lose a large consumer the overhead carries the cost of the gas higher and that in turn tends to raise the price to all consumers.

"The gas companies are urging the retention of this service charge not to oppress the poor man; not to make money easily; not to get something for nothing; but for the reason that it is their deliberate judgment that by the retention of the service charge they can make the gas service of more value to their respective communities, and in the long run sell gas at a lower price to all except the very smallest consumer and to those who use no gas at all, but insist on having a meter installed.

"May I suggest that this whole question is very complicated; it needs the careful consideration of experts, and would it not be well to leave this to the Board of Public Utility Commissioners? They have the confidence of the people generally, and they have the legal right to decide such questions. Why make an exception in this case?"

85-Cent Gas Rate Allowed

Honeoye Falls, N. Y.—In the matter of the petition (or complaint) of the Republic Light, Heat & Power Company, Inc., for an order fixing the maximum price which may be charged by it for natural gas in the village of Lima, Livingston County, and other municipalities in the county of Livingston, Monroe and Ontario, the Public Service Commission, second district, has granted an order fixing the price.

In the order it states that the Republic Light, Heat & Power Company, Inc., be authorized and empowered to charge for natural gas furnished by it within the towns of East Bloomfield, West Bloomfield, Bristol, Lima and Mendon and in the villages of East Bloomfield, Holcomb, Honeoye Falls and Lima, in what is commonly known as the Ontario district the maximum price of 85 cents per thousand feet, with a discount of 5 cents per thousand feet upon all monthly bills, together with a minimum charge of $1 per month for each meter furnished by the company. Said terms to be effective from the 7th day of March.

The hearing was held at Albany on Tuesday, March 1.

High Rates for Cooking Gas Sustained

Olympia, Wash.—The State supreme court in a decision handed down recently sustained the action of the Public Service Commission in granting the Seattle Lighting Company increased rates for cooking gas served consumers. The rates became effective April 1, 1920. The appeal of the city of Seattle from the commission's ruling was denied.

Can't Take Service Charge

Topeka, Kan.—Judge Clyde M. Reed, of the State industrial court, has handed down an opinion to the effect that the Lawrence Heat, Light & Fuel Company, which has imposed a service charge of 50 cents a month on the consumers of gas in the city of Lawrence, has no moral, and probably no legal, right to impose such a charge because the application of the company to impose the rate has never been acted upon by the industrial court.

Judge Reed stated that action would be at once started against the Lawrence Company to test its action, in view of the decision of Judge Booth of the Federal Court, handed down some months ago.

The decision was given to Walter Thiel, city attorney of Lawrence, who, with Mayor G. L. Kreeck, of that city consulted with the court in regard to the service charge.

The opinion is as follows:

Mr. Thiel: Will you communicate to the people of Lawrence the fact that if Lawrence was included in the order of Judge Booth, it is the opinion of the court of industrial relations that it was by the merest technicality; that this court has never passed upon the application of this company for the imposition of a 50-cent-a-month service charge and until that has been approved or otherwise disposed of there is no moral right and probably no legal right on the part of the Lawrence Company to collect and that proper proceedings will be taken at once to test the action of the Lawrence Company.

Hoagland Made Manager

Oklahoma City, Okla.—H. C. Hoagland has accepted the position as general manager of the Oklahoma Natural Gas Company.

Mr. Hoagland has been, since 1915, vice-president and general manager of the Central Oklahoma Light & Power Company, and prior thereto was connected with the leading public utilities in Illinois, Montana, Oklahoma and other States and especially well qualified to discharge the duties which will devolve upon him as manager of one of the largest systems in the State.

Mr. Hoagland and his family expect to move to Tulsa soon, where they will make their future home.

Gas Company Figures Show Community Growth

Turlock, Cal.—The report of the Turlock Gas Company as rendered to the State Railroad Commission for the past year when compared with the figures for previous years are a good indication of the growth of this community.

On Dec. 31, 1919, the capital account was $64,741.51, and Dec. 31, 1920, this amount had increased to $71,350.28, the capital stock issued being $50,000. In 1919, the gross operating revenue was $26,870.25, and in 1920, $41,532.18. The gross operating expense in 1919 was $22,660.74, and in 1920, $33,983.19. The net income for 1920 was $7,538.01. Gas consumers in 1918 numbered 584; 1919, 700; 1920, 820. The gas output in 1919 was 15,626,600 cu. ft., and the following year 20,481,800, while the wages paid increased from $8,090 in 1919, to $9,925 in 1920.

A. A. Caldwell, president and manager of the company, announced that arrangements had been made for increasing the generating capacity of the company 50 per cent. An increase in the size of the purification system has also been arranged for, so that by a simple switching of valves the new system will always be in operation even though one unit of it is being inspected. Caldwell states that about $10,000 will be spent on improvements to the plant within the next ninety days, greatly increasing the ability of the company to render efficient service.

Citizens Ask for Municipal Ownership

Atlanta, Ga.—The citywide campaign in Atlanta for the municipal ownership of the gas plant, which began when the Georgia Railroad Commission some weeks ago granted the Atlanta Gas Light Company an increase in its rates of from $1.45 to $1.90 per 1,000 cu. ft., developed into a fight against privately owned public utilities in general March 10, when about 500 Atlanta people attended a mass meeting to hear various advocates of municipal ownership elucidate its so-called advantages.

Resolutions were adopted at the meeting indorsing municipal ownership of the Atlanta gas plant, and providing for the appointment of a committee of eleven, consisting of one member from each city ward, to perfect the plans for a series of further community meetings in order to bring the matter to a final decision.

The Atlanta city council has already had presented to it a resolution relative to municipal ownership and has taken the matter under consideration. What will come of it remains to be seen. The council is asked to make formal requests on the Georgia State Legislature at its 1921 session to enact legislation permitting municipalities within the State of Georgia to purchase privately owned gas plants. Should the resolution presented to council be approved, and the State Legislature later pass such a law, it will provide for the purchase of private plants either by negotiations or arbitration proceedings, and will affect all plants now in operation or to be constructed in the future.

In the meantime the Georgia State Railroad Commision has handed down another decision, the statement being issued by C. M. Candler, chairman of the commission, declining to reopen for the present, at least, the Atlanta gas rate case. Numerous letters and resolutions had been presented to the commission asking for a rehearing of the case, the allegation being made that production costs have materially decreased since the rate raise was granted. In his statement Chairman Candler said that an auditor was making an investigation of the Atlanta Gas Light Company and an audit of the company's books, with particular reference to recent reductions in coal, oil and labor costs, and that final action regarding the reopening of the gas rate case would be taken when this audit was completed.

At the same time the Railroad Commission is being besieged by various interests and citizens of Macon and Savannah, Ga., relative to reduction of gas rates in those two cities. No definite action in either of these cases has been announced. The allegation is the same as in the Atlanta case, that costs have lately declined and gas rates should be reduced.

Board Orders Gas Companies to Increase Facilities

Los Angeles, Cal.—The Los Angeles Gas & Electric Corporation and the smaller distributors must give their patrons an adequate service.

This mandate, just issued by the State Railroad Commission in San Francisco, registers the second victory of the people against the gas company.

The first victory came with the decision of the city attorney that the Los Angeles Gas Company, and the smaller corporations, are operating without franchises.

The commission has now ordered the companies to submit plans of improvements and enlargements to be installed before next winter.

The commission's order follows the findings of Harry L. Masser, gas supervisor for southern California.

Mr. Masser himself has drawn up a plan for the reinforcement of the Los Angeles Gas Company's system and, in lesser degree—because they are much smaller—the enlargement of the other companies' facilities.

These comprehend the laying of a huge main to Pasadena and another to the Boyle Heights district, and a network of arteries and capillaries throughout the city.

To supply gas for this expanded system the companies must install generators and holders of enough power and capacity to meet the demand for several years.

The purpose in having the gas companies submit their plans was to determine whether they are on a scale to meet requirements.

One of the chief elements in the program, Mr. Masser stated, relates to natural gas.

"The Midway Company," he said, "is constructing a new line from the natural gas field in Kern County to Los Angeles, and this will be completed by May. It will bring 10,000,000 cu. ft. of gas into the city.

"The main reliance, however, will be manufactured gas. The commission has given special attention to the Los Angeles situation, which has been bad.

"The systems have not been adequate to meet requirements because of the unforeseen huge increase in population."

H. Z. Osborne, Jr., chief engineer of the Board of Public Utilities, on hearing of the commission's order, said:

"I am very glad to learn of this order. It evidently means that we shall get the sort of service to which we are entitled. The city has made the showing that there is a great and dependable natural gas supply, and that it should have the benefit of this.

"It is clearly up to the public utilities companies to provide the city of Los Angeles with an adequate supply of gas. The Railroad Commission evidently has taken this view; what is more important, has decided to enforce the very clear principle."

Wakefield Reduces Gas Rate

Wakefield, Mass.—The price of gas has been reduced in Wakefield from $2.20 to $1.95. The supply is by a municipal plant and the announcement of the reduction was coincident with the appointment of a new manager, C. W. Whiting of Boston.

The reduction offsets in a degree a 40-cent increase which went into effect Dec. 1. Charles S. Spaulding resigned as manager at about that time and Col. John H. McMahon has been temporary manager.

The new manager is an expert accountant and engineer who has been employed by the State Department of Public Utilities for some years in the investigation of lighting plants and their management. During the past year he has made a thorough inquiry into the conduct of the Wakefield gas plant, which has been owned by the town for more than thirty years, and has installed a new accounting system.

His work of investigation commended him to the town lighting commission and he accepted the proffer of the post as manager.

To Reduce Gas Rate 25 Cents

Owensboro, Ky.—The city commissioners of Owensboro have decided that the grant given the Kentucky Public Service Company last September of increasing the gas rate in this city to $1.50 should be annulled, and the city attorney has been instructed to draw an ordinance repealing a former ordinance to this effect. The rate will be put back on the old rate of $1.25 gross or $1.15 net. This grows out of a recent effort of a firm of Philadelphia bond brokers attempting to sell a lot of bonds of the company in this city in which it was shown that the company had made big profits in the operation of its plants during the years 1919 and 1920, when the commissioners were told that if the local plant was not granted an increase in its rates there was a possibility of its going into bankruptcy on account of the increased cost of operating expenses and fuel.

Sliding Scale Reduces Gas Rate

Lincoln, Neb.—Lincoln gas consumers will pay 11 cents less for gas used in February than they paid for gas used in January. The bills for February are due and payable in March. The decrease is due to the decline the cost of oil and fuel.

In its report to the city council under the sliding scale emergency rate fixed by the city council, filed at the city hall, the company shows that the March rate based on 27,014,900 cu. ft. billed in February was $1.4169 per thousand feet. In January the cost rate submitted by the company was $1.53 per thousand cubic feet. Where the mill figure exceeds a half a cent the rate takes a full cent and the actual cost is placed on a basis of $1.42 per thousand cubic feet. The report is submitted:

Gas sales reported and billed in February, 27,014,900 cu. ft.

	February Costs	Rate Per Thousand
Coke	$9,214.35	$0.3411
Oil	6,288.35	0.2327
Taxes	2,514.49	0.0931
Total		$0.6669
Plus fixed ordinance rate		0.75
March rate per 1,000 cu. ft.		$1.4169

A gas company official said that the report clearly indicates that consumers will get gas 11 cents cheaper when they pay their bills in March than they paid them in February. This will mean, he pointed out, that the company will have its income cut down $3,200 in March compared with the former month.

Gas Company Meeting

Derby, Conn.—The directors of the Derby Gas Company, at their annual meeting in the offices of the Gas Company, re-elected the officers which have served for the past several years. Charles H. Nettleton was elected president and treasurer, Arnold Norcross was elected vice-president and George H. Scranton was elected secretary.

The meeting of the stockholders was indefinitely postponed. The company has asked permission to increase its capital stock from $3,000,000 to $5,000,000 and the bill has been favorably reported by the committee on corporations in the House and has passed that body and will come before the Senate within a short time.